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finish

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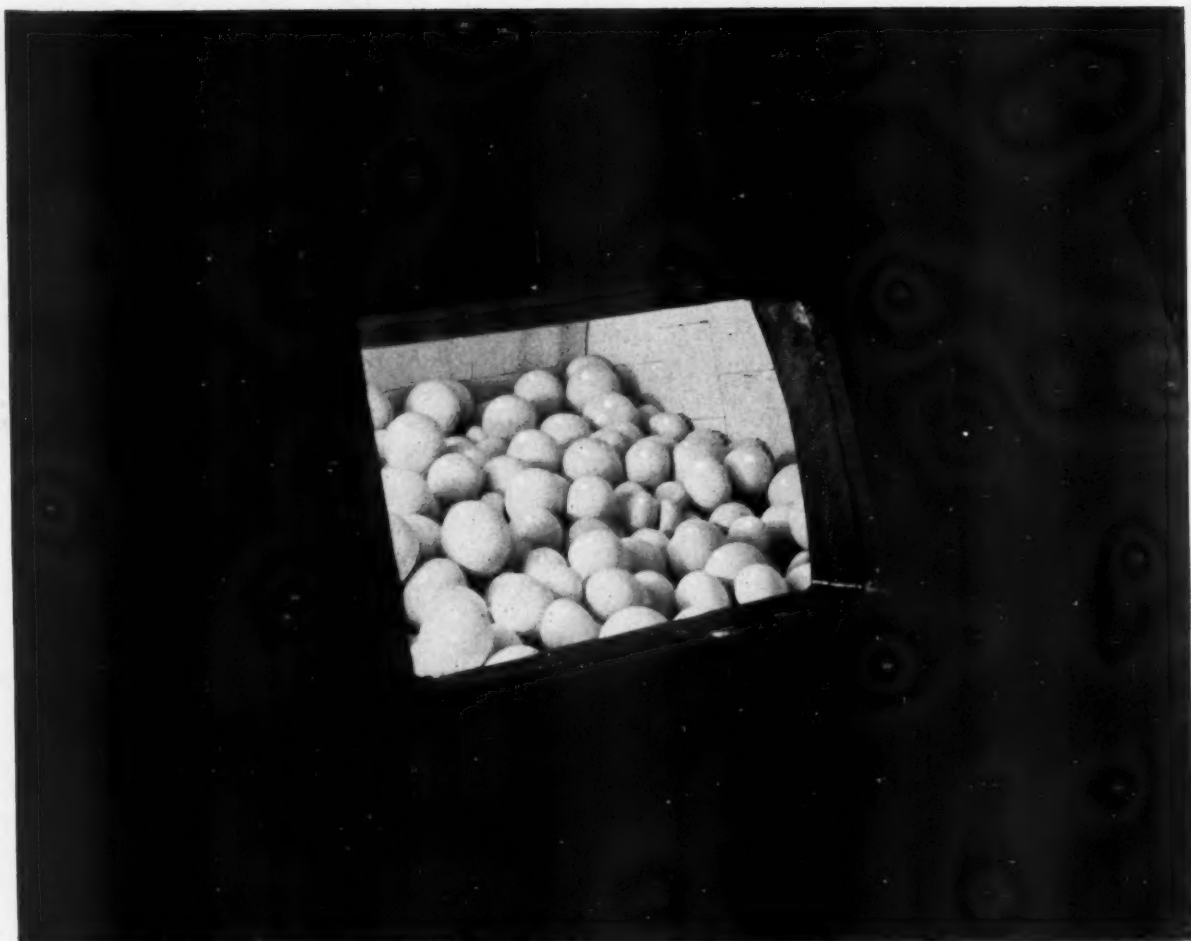
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finish

ceramic finishes on metal



ARE THEY READY?

Are all of your mills ready for operation on short notice? Has the lining in every mill been checked to make sure that it is sound and that re-lining will not be required soon after it is put in operation?

Have you taken a careful inventory of your stock of porcelain balls so that you are sure of an adequate supply to operate all of your mills? — Further, is your

inventory in correct proportion with respect to ball size?

These are questions that should be answered now, for with all of us busy with important war work it may not be possible to get prompt delivery on your replacement stock.

Order now and be ready for the "go" sign. Be sure your order is for McDanel extra-fired mill lining brick and McDanel mill-tested grinding balls.

McDANEL REFRACTORY PORCELAIN CO.

BEAVER FALLS, PENNSYLVANIA

Chicago Vitreous Enamel Product Company • Exclusive representatives for the enameling industry.

McDANEL MILL LINING BRICK

THE Finish Line

ARCHITECTURAL PORCELAIN — represents one of the brightest spots in the postwar picture for porcelain enameled metal. Let's give it a thought, without discussing statistics resulting from the many surveys covering all types of proposed after-the-war building. Every *finish* reader will have absorbed much of this information from newspapers, architectural and building magazines, or the various services offering creditable data on building potentials.

We know that all of the predictions are for a tremendous volume of building, both of new structures and of building modernization.

How much porcelain enamel?

Porcelain enamel has already made a good start in certain phases of commercial building. But — those who have been most active in the production of architectural porcelain would be the first to concede that the before-the-war progress represented no more than a "dent" in the surface of the potential volume.

The share that porcelain enamel is to get of the many, many millions to be invested in after-the-war building will depend in large measure on preparation made *before* materials are released for production.

Coordination needed

Individual firms planning "action" in the building field should have their plans in an advanced stage *now*. Several writers for *finish* have warned that for porcelain enamel to gain recognition among architects and building contractors a coordinated plan is needed. A successful plan of this nature calls for close cooperation between the principal producers involved, and should be comprehensive enough to include some standardization of engineering practice. Standardizing the product, at least to a reasonable extent, should be the first goal. Some standardization of engineering practice will be required. A simplified plan or procedure for installation crews is a "must".

Then — all plans for simplification or standardization should be coordinated so that a solid *industry* approach will be possible.

MAY • 1945 *finish*

A program of education

If and when such a coordinated program is achieved, the industry will still be far short of a money-in-the-pocket goal. Recommendations resulting from such a program must be placed in the hands of those who will be responsible for building design, materials produc-

tion, and installation of the material. The best plans in the world will mean little until they are known to, and accepted by, those who will use them. This is a sizeable job in itself.

The industry now has many good examples demonstrating the successful use of architectural porcelain enamel. And, more important, the time lapse has now been great enough to show the advantages of the product over competing materials, after years of effective service.

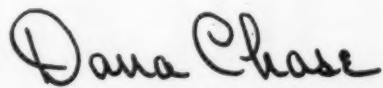
Individual company plans plus any more extensive cooperative plan of an educational or promotional nature should be in their final stages *now*.

A warning

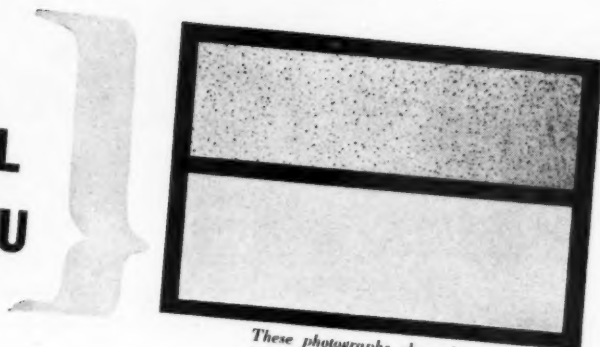
This educational program should go far enough to include maintenance suggestions. One of the "saddest" examples of "lack of knowledge" of our product can be seen as a permanent exhibit on one of Chicago's important streets. The "exhibit" was once an attractive retail store front of smooth, flat, colorful architectural porcelain — an excellent job of fabricating, enameling and installation. This store front would have retained its original beauty indefinitely but for lack of knowledge on the part of a servicing crew.

In cleaning the face of the building the service crew used destructive acids, and the enamel that had been used was *not* acid resisting. The appearance of the front was damaged to such an extent that the owners decided to *paint* over the porcelain enameled surface. Now instead of a lustrous porcelain face the store has a temporary surfacing, requiring frequent renewal.

Certainly, plans should be made to avoid repetitions of this episode. Some favor the general use of acid resisting enamels for all sign and store front work. In any case, those men who install and *service* our products should have information readily available that would help them to maintain, not destroy, the initial value of such installations.


Editor and Publisher

WHAT INLAND TI-NAMEL WILL DO FOR YOU



These photographs show the difference between white finish coat applied directly to the base metal and fired on ordinary enameling stock (above) and Inland Ti-Namel (below)



Hunter Nead (right) manager, and Frank Porter, ceramic engineer, both of Inland's Metallurgical and Inspection Department, check the fine quality of a single coat of enamel on a Ti-Namel panel.



This deep drawn part, 8 inches in diameter by 7½ inches deep, was made from 18-gage Ti-Namel Steel and then given one coat of white enamel.

Do you manufacture or buy porcelain enameled products? Then you should know about the remarkable advantages of the new enameling alloy steel—Ti-Namel—the most recent development of Inland research.

IF YOU ARE A MANUFACTURER. Inland Ti-Namel Steel eliminates the necessity for a ground coat on porcelain enameled products. White or color cover coat vitreous enamels are applied direct to the base metal. Ti-Namel does not age strain. It can be easily deep drawn. It reduces shop reoperations, edging, and scrap. It does not reboil. It is fired at lower temperatures, and in shorter time. Inland Ti-Namel Steel increases shop output, lowers manufacturing costs, and assures better enameled products.

IF YOU ARE A BUYER OF PORCELAIN ENAMELED WARE. When you specify Inland Ti-Namel Steel you will get enameled products that are unsurpassed, the finish being equal to the best multi-coat ware. The thin finish coat or coats applied direct to the base metal, will have high reflectance, reduced damage hazard, and longer service life. Write today for your copy of the new Ti-Namel Bulletin!

Pending patent applications on the new enameling process and product made thereby are owned jointly by Inland Steel Company and The Titanium Alloy Manufacturing Company under trust agreement.

Inland Steel Company, 38 S. Dearborn Street, Chicago 3, Ill.
Sales Offices: Cincinnati, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.

Principal Products: Bars, Floor Plate, Piling, Plates, Rails, Reinforcing Bars, Sheets, Strip, Structural, Tin Plate, Track Accessories.

INLAND TI-NAMEL

The effect of war production on metal stamping technique

with a question—will porcelain enamel have to face new fabricating methods?

By Capt. Howard Wolf

finish

The greatly accelerated development in the art of metal stamping, through application of stampings to war materiel, is of importance to manufacturers who are looking forward to mass production of consumer goods. To meet heavy production schedules for war materiel, the pressed metal industry was compelled to accomplish the seemingly impossible. How well they succeeded is now common knowledge. Savings in critical materials, man and machine hours alone are significant. Stampings as well as assemblies of stampings have been produced that would have been regarded impossible of achievement prior to the war.

Tremendous strides have been made in deep drawing without in-between annealing; in coining and close tolerance techniques; in fabricating methods such as gas and electric welding; and in silver and copper hydrogen brazing. Less tangible but equally important is the new approach by stamping engineers to production problems. Stamping engineers today think in terms of re-designing items for efficient use of stampings; they think also in terms of combining stampings with other stampings, and with machined castings or forgings. They see the problem as a whole in terms of the finished product.

Army Ordnance tackles the problem

Early in the war Army Ordnance recognized the necessity of finding new and faster production methods. A Suggestion and Conversion Unit was organized in Washington, with

branches in thirteen district offices. The stamping industry was called in to advise regarding how best to speed mass production of war materiel. This Unit studied many thousands of problems, making recommendations to the Chief of Ordnance. A high percentage of these recommendations was adopted, and a large majority involved stampings. The following examples illustrate the part stampings are playing in the greatest mass production program the world has ever seen.

Material and labor saving developments

A booster adaptor originally machined from solid bar stock was re-designed to be made from steel stampings, copper hydrogen brazed together. On one order for a million and a half adaptors enough steel was saved for 3,000 one-ton bombs. In addition, over 200,000 machine tool hours were saved.

A trigger cover plate which was originally machined from a forging by 29 operations is made of two stampings, on non-critical presses, and welded together. A supercharger housing originally made by machining aluminum forgings, joined together by bolts and nuts, was re-designed to be made from steel stampings welded together. This conversion alone saved sufficient aluminum in one year for 500 fighter planes.

Another pressed metal plant is drawing a case or tube approximately 32" long. Starting with a 21" diameter steel blank, of a thickness of approximately 0.036", the blank is drawn into a tube 18" deep and approximately 6 1/4" diameter in five operations. This tube is then zinc

plated and drawn to the final length of 32". No annealing operations are used, the completed tube having a burnished finish on the inside.

A 75 mm. smoke projectile was converted from a machined forging to a stamping. The engineers who originally designed the projectile believed that it could not be redesigned for production on presses. One stamping manufacturer, however, produced this item successfully on presses from 9/10" stock. The blank was 5 1/4" diameter and the projectile was completed in five draws. The cost, produced on presses, was \$1.32 against a cost of \$2.34 for the machined forging.

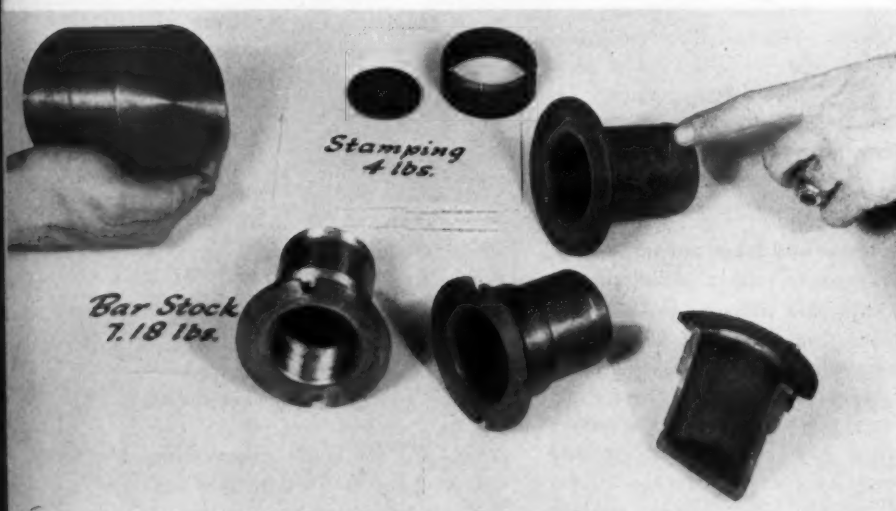
The top roller for a half track re-designed from a machined steel casting to a pressed steel, welded construction is now made by assembling five stampings into a completed unit. The original design required a casting weighing 42 lbs., a machining time of 60 minutes and a cost of \$15.00 each. The redesigned unit required material weighing only 25 lb., a machining time of 20 minutes, and a cost of \$6.50 each — a 57 per cent saving.

Capt. Howard Wolf

has been associated with the metal stamping industry for sixteen years. He was sales engineer at Mullins Manufacturing Company, Salem, Ohio, for seven years prior to entering the service on May 12, 1942. His experience was used effectively in the Production Engineering Section of the Cleveland Ordnance District and later in the Industrial Division Staff. He is now on duty at an undisclosed location.

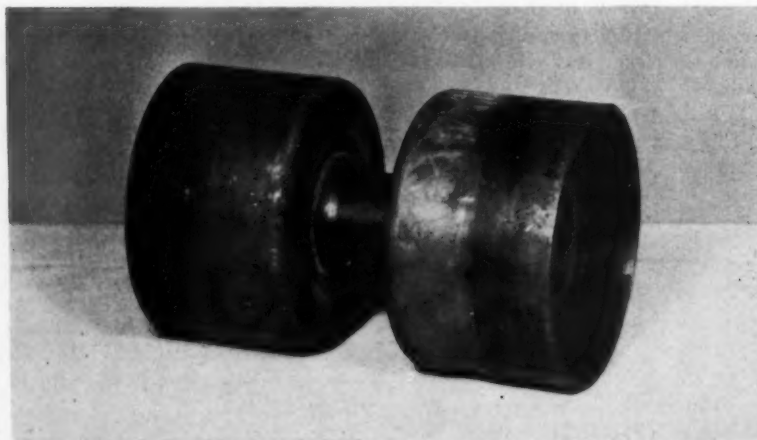


This feedway adaptor for machine gun mount, originally made from machined aluminum castings at a cost of over \$40, is being produced by welding together 14 steel stampings at a cost of \$15. Produced by Heintz Mfg. Co.



An ammunition booster converted from steel bar stock to a steel stamping with a saving of 3 pounds of steel per booster. Produced by Toledo Stamping and Mfg. Co.

This top roller for a half track was redesigned from a machined steel casting to pressed steel welded construction. Result: A 57% cost saving. This unit produced by Cleveland Welding Co.



Close tolerances possible

Rigid mechanisms consisting of formed sheet steel and parts built up by welding are being designed with dimensional tolerances and rigidity as close as are possible by any other method of fabrication. For instance, a binocular mount used on the unit employed for automatically aiming the Army's 60" searchlight, originally constructed of machined aluminum castings, was redesigned for formed and composite parts. The advantages of this redesign include cutting costs in half, reducing production time, simplifying machining operations, and conserving materials. Equivalent service qualities were maintained.

Close tolerance coining is illustrated in a washer for the Fram oil filter reinforcement. It was necessary that this part conform closely to the shape of the filter body. When welded to the body the joint had to be pressure-tight. It was first produced as a hot-forging, but scale caused pitting of the projection-welding ring. Close tolerances could not be held without expensive machining operations. The reinforcement is now produced in five press operations, the heaviest press used being 1,000-ton size. The center hole is produced by piercing in the final operation.

Large area assemblies

Large area stampings and assemblies of stampings are exemplified in the case of hangar hatch covers. When the Navy Department decided to build hangar space on some of the cruisers below deck instead of above, an opening in the deck sufficiently large to permit passage of the planes in and out was required. These openings were approximately 17 ft. by 39 ft. In order to close the opening a cover made from assembled and welded stainless steel stampings was designed. The cover proper and part of the mechanism is made entirely of 18-8 stainless steel. The cross ribs are of hollow construction and about 18" in height. In the production of these covers 3,000 stampings are required. In the sub-assembly of the end cross member alone, 45 stampings are assembled by arc and spot welding. Some of the stampings re-

quired are as large as 19" by 120". The total weight of the completed cover is about 16,000 lbs. and it is capable of withstanding a 10 lb. per square inch pressure.

Deep drawing on presses is illustrated by windshields for the large Army and Navy shells. Originally made from machined forgings, windshields 16" diameter at base by 27" high, and even 15" diameter by 34" high, are now regularly produced in presses. The savings through the use of stampings are as much as 95% in the cost of materials alone.

An ammunition booster was originally machined from 7.18 pounds of steel bar stock. It is now being made from three stampings welded and brazed together. Four pounds of metal are saved as well as critical machine and man hours.

The cal. .50 machine gun feedway adaptor originally made from machined aluminum castings at a cost of over \$40.00, is being produced by welding together 14 steel stampings, at a cost of \$15.00 each. In addition,

the weight is reduced from 32 lbs. to 12½ lbs.

These examples illustrate the developments in converting machined casting, forging or bar stock, to a stamping or assemblies of stampings for wartime materiel. The same engineering techniques can be applied to peacetime equipment and appliances.

An important partnership

Prior to the war stampings and porcelain enamel were close partners, as almost invariably steel stampings were used as a base for porcelain enamel. Steel stampings were a major factor in the rapid prewar growth of mass produced refrigerators, washing machines, electric and gas stoves, and many other household appliances. New developments in steel for enameling purposes, in improved qualities of frit, in one coat enameling, as well as advances in deep drawing, close tolerance stampings and in fabrication of stampings through welding and brazing, open up greatly

to Page 54 →



This windshield for large Army and Navy shells, originally made from machined forgings, is an unusual example of deep drawing on presses. This windshield was produced by American Pulley Co.

A total of 3,000 stampings are required in the production of this hangar hatch cover. Forty-five of the stampings are assembled by arc and spot welding. It was produced by Heintz Manufacturing Co.





THIS is the "science building" — the home of A. O. Smith research and engineering. The building, sometimes referred to as "The Glass House" because of its unusual and spectacular expanse of large plate glass windows, was planned to provide a maximum of light, air and space for occupancy by the company's large staff of engineers. The building received nation-wide publicity when it was originally built, due to its many architectural and functional innovations. Ventilation throughout is mechanical, and combines a system for heating and air conditioning. Portable partitions may be moved to meet fluctuating space requirements.

A section of this large research and engineering building is devoted exclusively to the company's Ceramic Research Laboratories, which are described in detail in the accompanying article.

As the enameling industry completes plans for its greatest of all building and modernization programs, full consideration should be given to the importance of laboratory research and control facilities.

Progress through research and engineering

including a detailed description of the A. O. Smith ceramic research laboratories

By *W. W. Higgins* • DIRECTOR OF CERAMIC RESEARCH DEPT., A. O. SMITH CORP.,
MILWAUKEE, WISCONSIN

finish

Progress through research and engineering has been the driving urge of the A. O. Smith organization ever since its humble origin back in 1874. The company has always been making things out of steel — things that invariably offered improvements and better values. Thus it has grown a thousand-fold from grandfather's six-man basement shop to the present 277 acres of large, modern plants with over 18,000 employees.

First it was parts for baby buggies, then stampings for bicycles. Later, with the advent of the horseless carriage, the company introduced the pressed steel chassis frame. In normal times hundreds of thousands of automotive frames are produced annually in the automatic frame plant — the only one of its kind in existence.

Developments in welding

World War I brought orders for bombs and the problem of how to weld them. To answer this need, A. O. Smith research and development engineers contributed the first modern electric welding process and coated electrodes. With this new tool it was not long before company technicians wrought a fateful change throughout the industries using pressure equipment. For tubular goods, tanks and huge high-pressure vessels the new welding became the trusted and accepted method of construction. Greater safety, lower costs, savings in material and absence of design limitations earned this recognition for welding.

As the research and engineering

work progressed, one product development led to another in ever-increasing diversification. Being builders of equipment for the petroleum and chemical industries, the company became acquainted with the many corrosion problems encountered in these industries. The problem of excessive soil corrosion in certain localities on oil and gas cross country pipe lines was a particular challenge to the resourcefulness of company engineers. In an effort to solve this problem, a large research program was started in 1928 for the development of a glass coating able to resist the soil corrosion. Thus, from the very beginning, the company concentrated on producing corrosion-resisting glass-fused-to-steel.

One thousand formulas tested for soil corrosion resistance

In the original research and development work on this problem, efforts centered on producing a glass coating on steel which would resist attack by the acids and alkalis found in soils of various parts of the country. A staff of ceramic engineers investigated more than 1,000 different glass coating formulas by testing some 11,000 glass-coated samples in soils brought from all parts of the country on the basis of their severe corrosion history. The goal was a glass having a hard and smooth surface, strong adherence to the steel, flexibility and resistance to rough handling, without impairing its corrosion-resisting qualities. Furthermore, the ideal glass had to live up to many requirements of manufacturing, pertaining to application, handling, costs, etc. Accelerated corrosion conditions were investigated, utilizing special rooms where elevated temperatures and hu-

midities could be closely controlled. From this large research program emerged formulas for a series of glass coatings that would withstand both the acid and alkali type soil corrosion and which met the aforementioned other necessary requisites.

With this research background in glass linings, the company was able in 1933 to take advantage of the situation created by the legalizing of beer and the subsequent enormous demand by the brewing industry for large glass-lined tanks. Again through research and engineering design, the first single-piece, glass-lined tank — more than twenty-five feet in length — was pioneered. In fact, engineering developments eventually made possible single-piece, glass-lined tanks as large as twelve feet in diameter by forty-five feet in length. Another development was "four point support" on integral head fins, which provided the ideal means for handling, shipping, and erecting single-piece, glass-lined tanks.

Controlled oxidation firing

The one research development which had much to do with the success of these large single-piece tanks was the development of the "Controlled-Oxidation" firing method for fusing the glass to steel. This process reduces to a minimum, and in most cases prevents, such common defects as copperheads, fishscales, burn-offs, etc., which are sometimes encountered when the conventional method of firing in air is used. In addition, this firing process allows the successful application on steel of many desirable compositions, which otherwise could not be utilized on a production basis.

With experience in the application



In this section of the "noisy equipment" room are the manually operated pressure tank sandblast machine, the inert atmosphere producer and a Rotap sieve shaker.



Raw material handling in the laboratory, showing the "good housekeeping" exercised.

Important pieces of testing equipment in the ceramic laboratory instrument room.



of glass linings to steel vessels, designed to function under pressure and stress, the company in 1936 started investigating the application of corrosion-resisting glass coatings to the tanks for automatic domestic water heaters. The need for such a tank was being emphasized more each year because of the accelerated swing to this type of water heater.

Engineering

domestic water heater tanks

Research studies soon made it apparent that, to facilitate reliable glass-lining results, the tank itself would have to be "engineered." The final result was to glass line the shell and heads as separate units before assembly into a tank, thus allowing easy access for complete inspection of all surfaces of the tank. Considerable research and field testing was done before our "Permaglas" coating and its application for this specialized field was perfected. Mass production of water heaters was started in 1940, with over 75,000 turned out the first year.

During the present war, production of these heaters was continued to fill Government defense housing requirements and necessary civilian needs, particularly for those areas where galvanized heater units have a short service life. The company's extensive research, engineering and manufacturing facilities are directed toward helping to win a speedy victory in many other ways. Major war products being produced by the company are: aerial bombs in sizes from 500 pounds to the largest block busters, torpedo air flasks for aerial and submarine type torpedos, landing gears for several types of bombers, and engineered hollow-steel aircraft propeller blades.

The A. O. Smith

ceramic research laboratories

The Ceramic Research Laboratories are housed in the "Science Building," often referred to as the "glass house" because of its unusual and spectacular expanse of large plate glass windows. A series of separate rooms are provided on the second floor of this building to allow for the best functioning of the various laboratory

equipment, as well as for operating convenience of the laboratory personnel.

A "noisy equipment" room

The first room contains what we call our "noisy equipment." This includes a pressure type sandblast cabinet, in which the sandblast nozzle can be manipulated manually from outside the cabinet. Regulation of the air pressure allows any degree of blasting intensity needed. Ventilation for this sandblast cabinet is furnished by an exhaust fan and dust arrestor, located directly below in the building basement. Since all present glass-coated steel products are on steel exceeding .100 inch in thickness, sandblasting is the cleaning procedure utilized in manufacturing.

Adjacent to the sandblast unit is a laboratory-sized "inert atmosphere" producer, needed in connection with firing glass-coatings by the "Controlled-Oxidation" method. The desired inert atmosphere is furnished by the exhaust gases from a single-cylinder, four-cycle gasoline engine. After passing through cooling water sprays, these gases are compressed to further lower the moisture content of the inert atmosphere before arrival via piping at the laboratory firing furnaces.

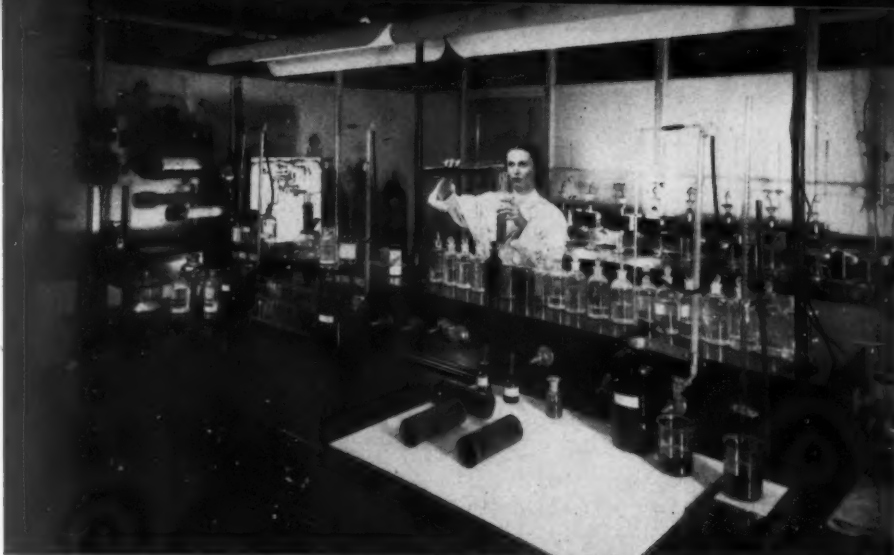
Cabinets for storage of the many steel samples needed for laboratory investigations, and a conventional Rotap screen shaking apparatus complete the equipment in the first room.

Frit research department

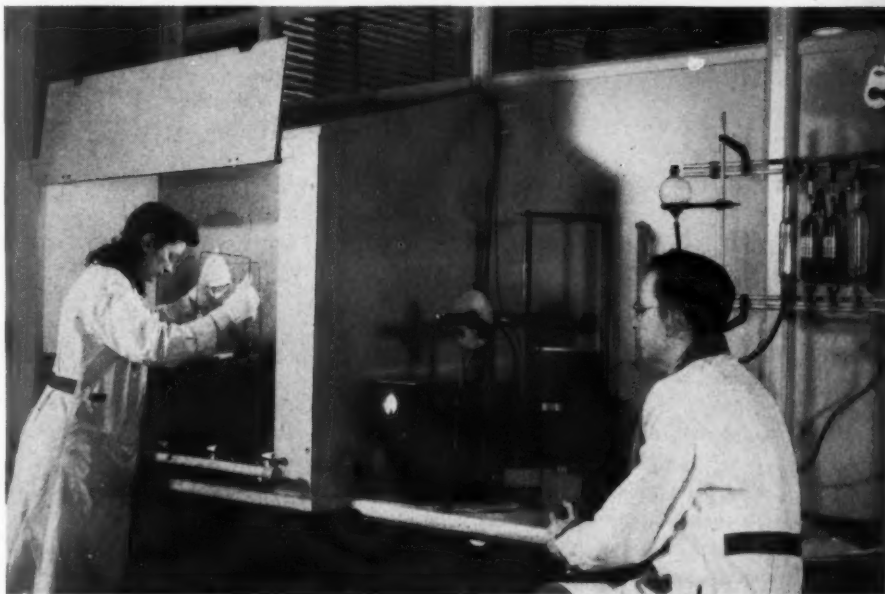
The frit-making equipment for research and development is located in another building adjacent to the Science Building. This equipment includes two small "pot type" smelters with tangential burners in which crucible batches of glass can be smelted. In addition, there is a 100-pound batch size rotary smelter for larger glass batches and a 100-pound frit charge ball mill.

Milling, application and firing facilities

Next to the "noisy equipment" room is a very large room where laboratory milling, application and



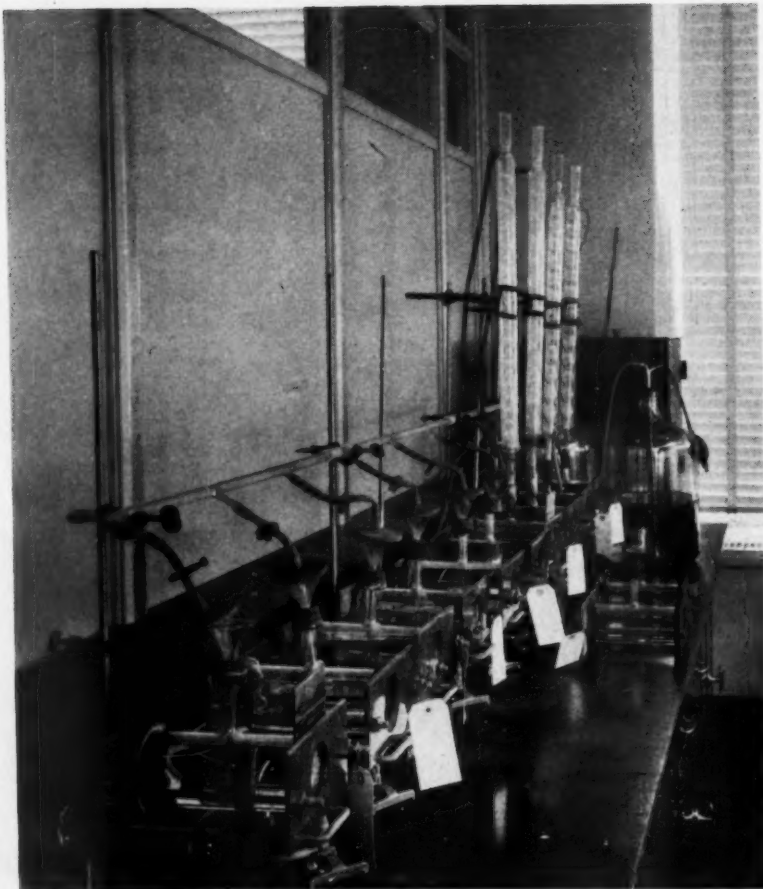
This view shows the laboratory "testing room" — completely equipped for running all types of accelerated corrosion tests.



A miniature pickling setup, the interferometer and an Orsat micro gas analyzer.

Three electric box type furnaces and divided water wash spray booth.





A series of accelerated corrosion test apparatus.

firing facilities are located. Storage cabinets for raw materials containers, an enclosed grinding rack for laboratory jar mills, and all the auxiliary equipment needed are located in one end of this space. The center of this area contains a water wash spray booth, divided so that two operators can work simultaneously. Adjacent is first a gas-fired hot plate for drying sprayed parts, followed by three electric box-type furnaces for firing. The exhaust for the hood over these furnaces and for the water wash spray booth is carried through a hollow building column to the basement, where a large fan exhausts to the outside.

The "inert atmosphere," utilized in the firing, is fed into the rear of the firing furnaces through a piping system with indicating flow meters. All these furnaces have heating elements in all inside surfaces with the exception of the rear wall, thus giving very

uniform heating conditions. Temperature recorders and controllers hold the furnace temperatures within approximately 5° F. Balances, mixing agitators, and much other auxiliary equipment complete the facilities in this room.

The laboratory "testing room"

The next room might be called the "testing room," since it is here that the glass coatings are subjected to all types of accelerated corrosion tests. Along one side is a setup where glass-coated plates are clamped to ends of glass cylinders which contain the corrosive test media. Loss of weight or loss of gloss are used as indication of corrosion resistance. Along the other side is a miniature "pickling setup" with a series of small glass coated tanks which are directly gas heated. Here new chemical cleaning and pickling methods for steel are constantly being studied.

The facilities in this room also include an interferometer apparatus, where the thermal expansion and contraction of glass coatings can be determined. Close by is a laboratory Orsat gas analysis apparatus where minute quantities of gas can be accurately analyzed. It is used particularly in connection with studies of the effect of various atmospheres in the firing of glass coatings. For this work a special electrically heated tube furnace is used with a "synthetic" atmosphere produced from a blend of any number of gases from gas cylinders, united in any proportion through a series of glass flow meters. The moisture content of the blended gases is then controlled either by passing through a drying column or a temperature controlled water tower before passing into the tube furnace itself.

An instrument room completes the present A. O. Smith ceramic research facilities. Here is located a binocular microscope for studying glass-lining structures, surface defects, etc. A glass electrode-calomel cell direct reading pH meter is used for quick determination of the acidity or alkalinity of solutions utilized in either corrosion-testing or experimental chemical cleaning of steel.

Another useful instrument is the "Junior Ohmist" electrical resistance meter, used for exploring glass-lined surfaces through a wet contact for continuity of coating. Where a more severe test is needed, a voltage or "spark tester" is used in which the voltage applied to the glass surface through a fine brass bristle brush can be varied in 500-volt steps up to 10,000. For testing at voltages above this a "Cisco type" spark tester is available. Glass coating thicknesses can be determined through the use of either a G.E. thickness gage or the Brenner Magne-Gage. For gloss determinations, opacity, etc., a Hunter Multipurpose Reflectometer is used.

Such a completely equipped laboratory has been of incalculable help to the A. O. Smith ceramic research staff in the successful development of corrosion-resisting glass coatings for steel.

New industrial horizons

have we reached the limit of industrial efficiency? — an answer in two parts

By *Alfred M. Staehle* VICE PRESIDENT, MCGRAW HILL PUBLISHING CO., NEW YORK

PART II

FROM PART I . . .

IN defining the period ahead, I should like to adopt a definition or, rather, an analysis of the post-war period, which was very interestingly made recently by Mr. L. R. Jackson, Executive Vice President of the Firestone Tire & Rubber Company, before a meeting of the American Society of Mechanical Engineers. He said:

"I like to think of three periods:

"The first period — the reconversion period.

"The second period — the catching-up-with-demand period.

"The third period — Which we hope will be a self-sustaining period with high level of production based on current demand."

PART II

The reconversion period

Let us consider the three periods ahead. Although it comes first, the reconversion period is the most difficult of all to predict. The big questions that no one can answer now are: When will the war in Europe end? How soon will that be to the end of the Japanese war? Certainly the prolonged outlook for the war in Europe with the greater demand of armaments and the slowing up of reconversion, may tend to make this period more abrupt than it appeared some months ago.

The second period

The catching-up-with-demand period should be an unusually prosperous period for manufacturers. In this period, there will be tremendous forces working favorably toward the adoption of labor-saving machinery and equipment.

But I believe there will be an even more powerful stimulant to the instal-

lation of labor-saving equipment in this period, and that will be provided by the almost certain elimination of the excess profits tax. During the war period, there hasn't been a great incentive to cut costs. But with the elimination of the excess profits tax, a dollar saved may amount to say 70 cents rather than only 10 cents (depending on taxes) — and industry will tackle cost reduction with a vengeance.

Lionel Edie, one of America's leading economists, recently issued a bulletin in which he said:

"Mechanization of plant equipment is the only answer to the high hourly wage and weekly wage rates which will prevail after the war. . . . This trend toward mechanization will culminate in a great boom in the production of labor-saving machinery of all kinds. The whole phenomenon will extend over a period of three to five years. The scope and ramifications of labor-saving ideas are unlimited. American industry is being driven into a cycle of intensive demand for devices which will cut the labor cost per unit of output. Even progressive companies which have hitherto prided themselves on leadership in technology will regard past accomplishments as obsolete and will push on to more advanced stages of the machine age."

But how much of a job can still be done in improving industrial efficiency? Here are some facts about the coal industry which are pertinent. In 1910 we produced about 3½ tons of coal per man per shift. Through improved methods and machines, we are now producing about 5¼ tons of coal per man, or just about 50 per cent more coal for every man working in the industry. But these are the

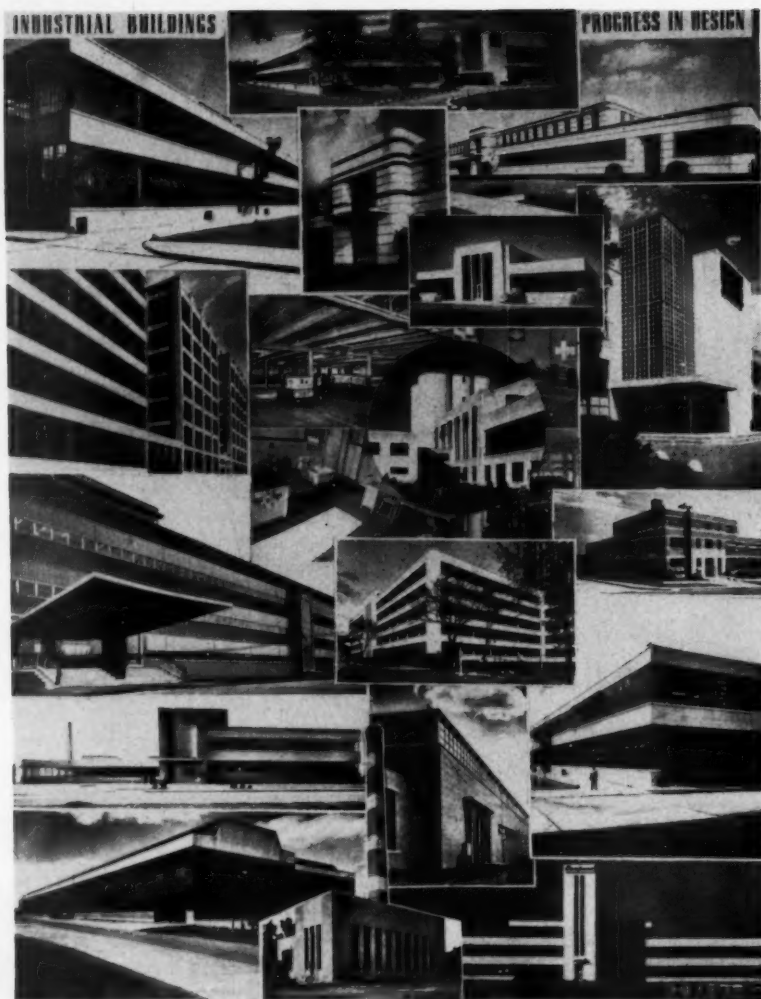
average figures for the entire industry. Modern mines are producing more than 20 tons of coal per man — four times the industry average. But even that doesn't tell all the story. It has been demonstrated in a few mines, where modern machines and methods have been employed under ideal conditions, that as high as 50 tons of coal per man can be mined!

Now why is the industry average so much lower than the attainable ideal? There are, no doubt, many reasons — but one reason is of particular interest. As you know, mechanical loading has greatly stimulated mechanized mining. But the editor of "Coal Age" tells me that not more than 10 per cent of the loading machines and similar equipment in this industry are used to their practical capacity. The reasons are that other equipment in the mine, such as cutting machines or mine cars, as well as other mining methods, such as shooting and drilling, are not properly engineered to the materials handling equipment. Therefore, while handling costs have frequently been greatly reduced, the entire mining operation has not been made thoroughly efficient because the entire installation was not properly engineered.

Overall cost reduction through engineering coordination

In that story, there is a sermon. First, it forcefully illustrates the tremendous savings possible in this industry — but it also illustrates the challenge to manufacturers of labor-saving machinery. That challenge is not alone to install handling equipment to lower handling costs but to utilize fully the opportunities to reduce over-all cost — by engineering the handling equipment to the production equipment — or *vice versa*.

This story may or may not be



Progress in recent years in the design of industrial plant buildings is portrayed here. The buildings are pleasing to the eye, but the interior layouts determine their utilitarian value. Have our layouts kept pace with exterior design?

PHOTO COURTESY WESTINGHOUSE

wholly typical of industry as a whole. But I am sure that it is not an isolated example. What opportunities are there in the manufacturing industries?

For some time, the staff of "Factory" has been conducting a continuing study to find out what modernization plans industrial plants are making in the post-war period. The study has been conducted on a personal interview basis, with representatives of "Factory" exploring with operating executives what steps could be taken in that plant to reduce operating costs or to improve product quality. So far, we have pursued this inquiry in more than 250

representative plants throughout the manufacturing industries.

Can new production equipment help?

Among the many questions we asked, there was this one: "In the post-war period, do you believe that improvements either in the quality of your product or in lowering manufacturing costs, could be made by the installation of new or modern production equipment? (We defined production equipment as "machine tools, looms, rolling mills, or whatever major production machinery you use for your work.") We specifically asked the respondent to an-

swer the question in one of these three ways:

1. *Substantial improvement could be made.*
2. *Some improvement could be made.*
3. *No substantial improvement could be made.*

Remember, before I give you the answers, that there are some who believe that the day of the production man is largely passed and that the "margin of improvement has been drastically reduced."

The answers came out this way: 45 per cent answered that *substantial* improvement could be made! Those who believed that some improvement could be made added 51 per cent — so only 4 per cent of all the plants interviewed felt that no improvement could be made by the installation of new production equipment. Who says our job is finished? Certainly not the hard-headed production men who know what can be done in their own plants!

If you think that is surprising, I can still give you one that is even more amazing. Some of you may have heard of the poll that was conducted for "Factory" by the Opinion Research Corporation to find out what the 17,000,000 workers in American industry think about such things as post-war jobs, unions, management, and foremen. It is possibly the most serious effort made to date to find out what the worker really thinks. Among other questions the worker was asked how good a job he felt his company was doing to keep down manufacturing costs. Only 48 per cent thought their companies were doing a good job; 21 per cent thought the job was average; 9 per cent thought the job was poor; and 22 per cent had no opinion. You can take your pick as to what the workers' opinion on this subject is worth — but you can hardly conclude that the workers of America's industrial plants see no further opportunity for increasing industrial efficiency!

Mechanical handling will help

One more example of this kind. I asked our editors to tabulate for me the last ten process charts which they

had procured from industry. These charts represented ten operations in different plants where all the steps involved, such as operation, storage, inspection, and transportation, had been tabulated. Altogether, in the ten operations there were a total of 3103 elements, and 48.7 per cent of them were elements involving the handling and moving of the product. Further analysis of the charts showed that the methods engineers in these plants were able to set up new methods and install mechanical handling equipment which eliminated 930 of the 3103 transportation operations.

And some say that we have reached the limit of industrial efficiency! Let us pause now to ask: Among the 45 per cent of the industrial plants in America that feel they could improve operations through the installation of modern production machinery, how much of it will be properly engineered to needed materials handling

equipment so that its full potentialities will be capitalized?

Our second challenge — marketing and selling

It would be a gross omission not to point out that there are great opportunities for improvement in these phases of our work. The great increases in sales and consumer items that I have recited earlier were not achieved solely through improved manufacturing and mass production. They were achieved also through mass selling, through smart, aggressive marketing, through hard-hitting salesmanship and alert merchandising and advertising.

And that gets us immediately into one of the great opportunities for improved selling — and that is improved sales training.

It goes without saying that our most important lines of communica-

tion between the manufacturer of goods and his customers must be equally efficient. I refer to advertising.

The first principle of good advertising

The turnover in industry in the post-war period will be unlike anything we have ever known before. In addition, many of the plant men whom we shall have to sell, have never been brought up in an atmosphere of cost saving. They have been trained during the war in an atmosphere of getting it out at any cost. Many of the men whom we shall have to sell in the future — and I hazard the guess that probably the best and most alert — are now working for Uncle Sam. To sell all these will be a tremendous job that can not be done alone by hand methods. We shall have to employ efficient mass selling. And I should like to leave this one

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A multiplicity of materials handling devices are being used to good effect at this work station. A survey of ten operations in industrial plants showed a total of 3103 elements, 48.7% of which were elements involving "handling and moving" of the product. "... methods engineers in these plants were able to set up new methods and install mechanical handling equipment which eliminated 930 of the 3103 transportation operations."

PHOTO COURTESY WESTINGHOUSE



Weatherproof aero signs

offer a new market for porcelain enamel

THE air traveler looking down from the plane window sees an ever-changing panorama. Dozens of towns, both large and small, pass under as he watches. The commercial or transport pilot, of course, knows where he is at all times by use of his instruments and radio. His passengers, however, seldom know where they are until the plane lands. This is somewhat annoying to the traveler, who is usually a motorist used to seeing highway signs, city limit markers, and factory names that keep him constantly informed as to his whereabouts.

Contact navigation problems

Private plane owners and pilots are confronted by a similar problem. If they have a two-way radio in their ship or are expert navigators, their problem is not too difficult. But if, as is usually the case, they must depend upon contact navigation or identification of landmarks, there is an ever-present danger of getting lost. Missing one check point, and subsequently others, may necessitate a forced landing to get directions, caus-

ing loss of time, and embarrassment.

Permanent, easily seen and easily read signs conforming to standard aeronautical practice would be of great help to private plane pilots and airline passengers alike. Such aero signs as suggested by the CAA might designate a town's name, latitude and longitude, direction and distance to the nearest airport, or identify a factory or important landmark and, at the same time, indicate the route to the airport or landing strip. Signs of this nature can usually be installed on large, conspicuous roof surfaces in or near the center of a town or city, or near a main highway intersection or railroad. Their location should be such as to provide good visibility from all angles at an elevation of 3,000 feet. Air markings can now be installed in the United States, with the exception of a restricted strip of 150 miles inland along the West Coast. The Army and Navy have so advised the CAA.

The Civil Aeronautics Administration has done a great deal of investigating and research on the subject of marking for air travel and has made

considerable progress in the use of painted markers. They have not, as yet, attempted to develop any permanent signs. Their color recommendations call for a black background and the use of chrome yellow characters as being the most visible, or the use of white when ground markers are contemplated. With porcelain enamel, any desired color may be procured.

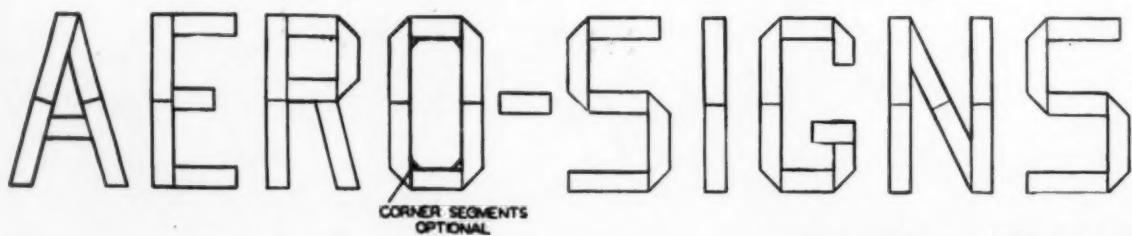
Enamel for permanence

Porcelain enamel on steel has demonstrated its suitability for permanent signs and has been widely used by all types of industry for markers, identification signs, advertising displays, permanent notices and store fronts as well as for household and industrial equipment. Any desired color is readily available and the finished product is bright, weatherproof, fireproof, sturdy and permanent.

To provide permanent markers which will not become faded by weathering, the Market Development Division of Carnegie-Illinois Steel Corporation has designed a series of

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Details of segment type construction with a method of attachment for porcelain enameled steel aero signs — a suggested convenience for air travelers and aid to contact navigation.



ATTACHMENT:
THREE, FOUR OR SIX HOLES, $\frac{1}{8}$ " DIA., PUNCHED IN THE CORNERS OF EACH SEGMENT BEFORE ENAMELING. SEGMENTS ATTACHED TO ROOF BY MEANS OF SCREWS INSERTED THRU LEAD OR CUP WASHER, THRU HOLE IN SEGMENT, THRU MASTIC FELT WASHER OR PAD AND INTO ROOF.

PATENT PENDING

FIGURE -1

Carl F. Blunk

MAY • 1945 finish

Combined Meeting of A.C.S. Chicago Section and Chicago District Enamellers Club

A COMBINED meeting of the Chicago Section of the American Ceramic Society and the Chicago District Enamellers Club was held at the La Salle Hotel, Chicago, on Saturday, April 7.

The main purpose of the meeting, which was scheduled as an all-day session, was to provide for the presentation of papers originally scheduled for the annual A.C.S. convention in Buffalo. After the national convention was called off, due to the present transportation emergency, it was decided to present as many of the papers as possible at Section meetings.

The Chicago meeting was divided into two meeting groups—one, the Enamel Division, and the other a General Session.

Enamel Division —

Morning program

Professor A. I. Andrews, University of Illinois, served as chairman of the Enamel Division morning meeting. The program included the following:

* "Porcelain Enamel—The Versatile Finish," by F. L. Meacham, Manager, Sales & Service, Chicago Vitreous Enamel Product Co., Cicero, Ill.

* "Properties and Uses of Several Clays in Porcelain Enamels," by Ralph L. Cook, Department of Ceramic Engineering, University of Illinois, Urbana, Illinois.

A.C.S. president speaks at luncheon

At a luncheon, attended by over 100, enamellers and ceramic men listened to the remarks of E. H. Fritz, A.C.S. president, and C. S. Pearce, associate secretary. These men were introduced by Hugo Filippi, chairman of the Chicago Section and vice president of Illinois Brick Company.

Mr. Fritz stressed the importance of strengthening the sectional groups, particularly during the present trans-

portation emergency, so that the necessary work of the Society can be continued effectively. He said that possibly it was a "good thing" that no national convention was held this year, as it has served to greatly strengthen the Section organizations.

New Officers

Chicago Section of A.C.S.

Chairman: Robert Stevens, refractories engineer, Chicago Retort and Fire Brick Co., Chicago, Illinois

Vice Chairman: R. L. Cook, Department of Ceramic Engineering, University of Illinois, Urbana, Illinois

Secretary-Treasurer: J. J. Svec, managing editor, "Ceramic Industry," Chicago, Illinois.

Mr. Pearce referred specifically to the Society's publications and recommended that members use the "ceramic abstracts" made available. He said it was planned to include foreign abstracts, such as Russian, etc.

Afternoon sessions

The Enamel Division meeting in the afternoon as presided over by W. W. Higgins, A. O. Smith Corporation, Milwaukee, chairman of the program committee for the Society's Enamel Division. The program included:

* "Crazing of Electric Stove Tops in Service," by R. L. Fellows, assistant director of research, Chicago Vitreous Enamel Product Co., Cicero, Ill.

* "Factors Influencing Fluxing Action of Various Oxides in Low-Temperature Borosilicate Glasses," by Howard R. Swift, Department of Ceramic Engineering, Urbana, Illinois.

* See A.C.S. convention report for resume of this paper

A paper of interest to enamellers was also presented in the afternoon General Session meeting. This was: "The Infra-red Principle, What it is and What it Does," by William H. Tesmer, chief engineer, Burdett Manufacturing Company, Chicago, Ill. This paper was delivered by D. A. Jacobsen.

Discussion

Some interesting bits of discussion were picked up in the Enamel sessions. Among the unusual applications of porcelain enamel referred to by MEACHAM were control equipment (insulators) for electric locomotives. These are copper bars, porcelain enameled for its electrical properties and abrasion resistance.

ANDREWS mentioned the use of porcelain enamel for hoppers in industrial automatic stokers.

TUTTLE spoke of the life of porcelain enameled fluorescent reflectors compared with housings with organic finishes. In some instances after only nine months' use in cotton mills, where corrosive conditions are extreme, organic coated housings were completely corroded through. Porcelain enameled housings answered this problem.

COOK mentioned the use of porcelain enamel to replace mica as an insulation on bolts for electrical motors.

SMITH referred to the enameling of the interiors of centrifugal pump housings having increased efficiency 20 per cent.

BENNETT indicated that studies of heat emissivity of porcelain enameled metal were important.

In connection with Cook's paper on clays, SWEELY pointed to the importance of clays as they affect opacity in enamels. Six to seven per cent clay may be equal to 1 per cent of opacifier in high opacity enamels. This factor is, therefore, to be considered in enamel costs.

BENNETT pointed to the difference



of "surface" hardness and "under surface" hardness in gouge testing of enamel surfaces.

ANDREWS stated that the paper "leads up to the possibility of synthesizing clay for porcelain enameling." He also referred to the possibility of developing clays for specific kinds of enamel.

References

- F. L. Meacham, *Chicago Vitreous Enamel Product Co., Cicero, Ill.*
- A. I. Andrews, *University of Illinois, Urbana, Ill.*
- George Tuttle, *Benjamin Electric Mfg. Co., Des Plaines, Ill.*
- R. L. Cook, *University of Illinois, Urbana, Ill.*
- C. E. Smith, *Chicago Vitreous Enamel Product Co., Cicero, Ill.*
- D. G. Bennett, *University of Illinois, Urbana, Ill.*
- B. T. Sweely, *Chicago Vitreous Enamel Product Co., Cicero, Ill.*

The Infra-Red Principle — what it is and what it does.

By WILLIAM H. TESMER

When Sir Isaac Newton allowed a beam of sunlight to pass through a triangular prism of glass, he observed that the transmitted light formed a rainbow, or spectrum with the familiar colors red, orange, yellow, green, blue and violet merging one into another. He concluded that all these colors are originally present in sunlight, or what impressed the eye as being "White" light. The thing that distinguishes one color from another is the length of the light waves — the red light having the greatest wave length, and the violet the smallest. It takes about 33,000 waves of red light, or 63,000 waves of violet light to extend the distance of one inch. These wave lengths of light are within the so-called visible spectrum. Beyond the extreme ends of the visible spectrum other radiation can be detected. Beyond the red end of the spectrum thermometers can determine radiations called "Infra-red" radiations. The radiation from a hot object is very rich in these longer rays.



Retiring president, E. H. Fritz.
" . strengthen the sectional groups . "



R. L. Fellows
" . . . two types of crazing . . . "



Howard R. Swift
" . . . strontia in enamels . . . "

VINISFOTOS

Left row, top to bottom: A. O. Smith's Wesley Martin; "Charlie" Pearce of A.C.S.; Dwight Bennett, U. of I.; Benjamin Electric's George Tuttle; and, lower photo, Jack Eckel and Carl Mueller of Carnegie-Illinois. Right, top to bottom: "Tom" Linden and "Cliff" Smith of Chicago Vit; T. E. Thompson, Wilmette, Ill.; and Bruce Wagner of Tam.



F. L. Meacham
"... the outlook is bright ..."



Karl Kautz
"... adherence and opacity ..."



R. L. Cook
"... varying bubble structure ..."

FINISHPHOTOS

Their wave lengths range up to 1/80th of an inch. The stream of radiant energy from the material body at a given temperature consists of waves of all possible lengths, but mixed in a definite proportion. Scientific theory, backed by many precise experiments, tells us the exact make-up of this mixture for the ideal radiator. The "Infra-red Principle" Gas Burner is essentially a thermal radiator, closely approximating the standard of an ideal radiator whose temperature is maintained by the combustion of an air-gas mixture on the radiating surface itself. This surface temperature is approximately 2300° F., with 99% of its area giving off Infra-red rays.

The "Infra-red Principle" of gas heating has been thoroughly proved in such applications as drying, melting, vaporizing, pre-heating, carbonizing, singeing, annealing, charring, roasting, baking and innumerable other widely different methods of production. Its application has made possible the advantages of lower fuel cost due to high efficiency, and increases in production due to accomplishing its designed purposes with greater speed.

In the porcelain enameling field "Infra-red Principle" gas burners installed in the enamel driers have materially cut drying times — on one particular installation from 30 minutes to 3 minutes.

Program for Enamellers Club Annual Meeting

The Chicago District Enamellers Club will hold its annual meeting on May 26 in the Lincoln Room (18th floor) of the La Salle Hotel, Chicago, Illinois.

Meeting time: 12:00 Noon

Luncheon at 1:00 P.M.

Entertainment.

Program speakers

C. L. Van Derau, works manager, Electric Appliance Division, Westinghouse Electric & Manufacturing Company.

A. I. Andrews, Head of the Department, Ceramic Engineering, University of Illinois.



Left row, top to bottom: Wayne Deringer of A. O. Smith with Ralph Cook, U. of H. B. Taylor of Eagle-Pitcher; Col. Carl Zwermann, Engr. Corps; George Green General Porcelain. Right row, top to bottom: Hotpoint's G. E. Terry; Inland St. Frank Porter; "Bill" Plankenhorn of Federal Electric; and Clark Hutchinson of Ing-

The American Ceramic Society forty-seventh annual

a report on the board of trustees meeting in Buffalo and res

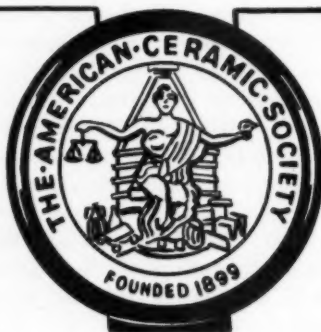
THE forty-seventh annual meeting of the American Ceramic Society was held at the Statler Hotel, Buffalo, New York, on Monday, April 16. The meeting was attended only by officers, trustees, committee chairmen and members of the Upstate New York Section.

The Upstate New York Section acted as host to the officers and trustees of the Society for the meeting. Milton H. Berns of the Electro Refractories and Alloys Corporation is Section chairman.

As had been previously announced, the large industry group meeting originally scheduled was cancelled because of the emergency in rail transportation.

C. Forrest Tefft, president, Clay-

CONVENTION IN PRINT
Resumes of General Session
and Enamel Division Papers.



craft Company, Columbus, Ohio, was inaugurated as president of the American Ceramic Society on Monday night. Mr. Tefft has served as both treasurer and vice president of the Society. He is a trustee of Alfred University and is on the Board of Managers of the New York State College of Ceramics. He is a past president of the Builders Exchange of Columbus and is a director of the Columbus Chapter of Kiwanis International.

J. Edward Hansen, director of service, Ferro Enamel Corporation, Cleveland, Ohio, was elected vice president. Mr. Hansen is well known in enameling circles, having published three books on enamels. He was a trustee of the A.C.S. from 1940 to 1943, and has served as a trustee of

GENERAL SESSION PROGRAM

Postwar employment

By F. D. NEWBURY

The paper on Postwar Employment covers a very small part of this important subject—the probable size of the labor force and the number of civilian jobs. Instead of the figure of 60,000,000 jobs that has been widely publicized, a figure of 52 or 53 million jobs represents a more reasonable and sensible goal. As a matter of fact, 60,000,000 people could not be kept at work after the war without forcing some five million people to work against their own desires and best interests.

The usual discussion of the postwar labor force and post-war employment oversimplifies the picture. The labor force is not a homogeneous

body with sharply defined boundaries. Young people are continually entering employment and older people are always leaving. The war experience has shown the existence of a very sizable labor reserve of at least 15 per cent of the normal force. These are women who would not seek work under ordinary conditions, boys and girls who leave school prematurely, and older people. Then, within the normal labor force, there is at all times a reservoir of unskilled, low-grade labor that shrinks in size in good times and grows in depression. These are the subsistence farmers, migrant laborers, and casual workers. In good times this reservoir of low-

grade labor supplies labor for higher-rated jobs, and in poor times the least efficient and able workers necessarily fall back into this pool of subsistence labor.

There is a labor reserve of potential workers and a pool of subsistence labor available to increase the normal higher-grade, money-income jobs. The size of the labor force is extremely flexible as war experience has demonstrated. What it will be after the war will depend largely on the general level of prosperity and, strangely enough, the more prosperous we are the smaller the active labor force will be.

General Session to Page 33 →

Annual meeting

a convention in print

and resumes of important general session and enamel division papers

the Porcelain Enamel Institute.

John D. Sullivan, assistant to the director, Battelle Memorial Institute, Columbus, Ohio, was reelected to the position of treasurer. Mr. Sullivan, who has served for several years as treasurer of the Society, is a research engineer and is associated with the War Metallurgy Committee. He is author or co-author of nearly seventy papers on ceramics or metallurgy.

Ross C. Purdy is general secretary and editor, a position which he has held for twenty-five years. Mr. Purdy is located at the Society's headquarters at 2525 North High Street, Columbus 2, Ohio.

Edward H. Fritz, retiring president, stressed in his address the need for research work to help the ceramic



C. Forrest Tefft, President, Claycraft Co., elected new A.C.S. president.

industry forge ahead. He suggested a fund for the study of fundamental problems of the clay and silicate industries.

Clarence Samuel Ross, Chief of the Section of Petrology, United States Geological Survey, Washington, D. C., gave the Edward Orton, Jr. Fellow Lecture, speaking on "Minerals and Mineral Relationships in the Clay Minerals."

If war restrictions are relaxed, the Society will hold its next annual meeting in Cleveland, Ohio, April 1946.

Inasmuch as the 47th Annual Meeting is designated as a "Convention-in-print", *finish* presents in this issue resumes of the General Session and Enamel Division papers.

ENAMEL DIVISION PAPERS

Factors influencing fluxing action of various oxides in low-temperature borosilicate glasses

By HOWARD R. SWIFT

In an investigation of the fluxing ability of strontia in enamels it was found that the action of strontia varied considerably in different types of glasses. After a systematic variation of the composition in which strontia displayed its maximum fluxing action, this effect was traced to the high fluorspar and low alumina

content of this glass.

Further investigation revealed that the high fluoride solubility in strontia glasses, as compared with similar glasses containing lead and barium oxides, was responsible for the greater fluidity. In this type of glass the fluxes, strontia and fluorides in solution thus produce a greater fluidity

than lead or barium oxides with less fluoride in solution.

It is suggested that the data may be of value in compounding of low-temperature borosilicate glasses of this type. The general effect of one flux influencing the action of another, by regulating its solubility, may have some further applications.

Molybdenum in enamels: III (Typical molybdenum enamels)

By KARL KAUTZ

This paper was concerned with enamels which contained mill additions of a simple molybdate and antimony oxide to promote adherence. Also given in this paper were some

compositions which had molybdenum smelted in the frit to produce adherence and opacity.

Clear enamel compositions were given which matured at temperatures

ranging between 1300° F. and 1575° F. These enamels were used experimentally as gray ground coats or as one-coat color bases. Antimony oxide and molybdate of barium, lead, cal-

cium or sodium were used as mill additions to promote adherence in these enamels.

Low temperature enamels high in lead oxide were reported. These enamels gave good coverage in coats of .002" to .004" with Class A acid resistance on both cast iron and sheet steel. The firing range of these enamels was between 800° F. and 1000° F. Molybdenum may be smelted in the frit to give opacity and adherence or molybdates may be added to the mill to promote adherence with molybdenum-free frit.

Clear acid resisting compositions (titania-free) were given which matured at temperatures between 1550°

F. and 1600° F. Antimony oxide and one of the molybdates mentioned above were used as mill additions to promote adherence.

Raw enamels, or partially fritted enamels, may be compounded using mill additions of antimony oxide and a molybdate to promote adherence. A number of compositions of this type maturing between 1500° F. and 1600° F. were given.

White antimony-bearing enamels may be applied directly to steel as white ground coats or as one-fire white finish coats. Mill additions of molybdates helped to promote adherence in this type of enamel. Compositions of white antimony-bearing en-

amels maturing at 1400° F., 1475° F. and 1525° F. were given.

White enamels containing molybdenum in the frit were developed and reported. It was found that molybdenum smelted in enamels of special composition produced excellent opacity and adherence at temperatures ranging between 1300° F. and 1500° F. These enamels can be applied directly to sheet steel to produce white ground coats or one-fire white finish coats. Mill additions of antimony oxide and/or molybdates are unnecessary when the frit contains molybdenum. A number of compositions of this type of enamel were reported.

Molybdenum in enamels: IV (White molybdenum enamels)

By KARL KAUTZ

This paper was concerned with the investigation and study of white molybdenum-bearing frits. The work reported was divided into the following groups: (1) White ground coats, ordinary; (2) white finish coats, ordinary; (3) white ground coats, acid resisting; (4) white finish coats, acid resisting; and (5) white cover coats, (for overspray and second coat application) acid resisting. Greatest progress was made with ordinary white enamels for direct application and highly opaque acid resisting white cover coats. Acid resisting white coats applied directly onto steel, while showing promise, have not been fully developed.

Molybdenum trioxide smelted into

enamels of special composition imparts to the enamels three desirable properties, (1) good adherence; (2) high opacity; and (3) low viscosity. These properties are important in compounding white enamels for direct application to steel. Enamels maturing between 1300° F. and 1500° F., showed maximum opacity and most compositions were studied in this range. Enamels in this temperature interval, it is believed, results in the following advantages: (1) Sheet steels are far less reactive (oxidize less rapidly, evolve less gas and warp less) between 1300° F. and 1500° F. than at higher temperatures; (2) furnace refractories and metallic fixtures as well as tools have

a longer life at these lower temperatures; (3) less fuel is required to maintain the lower temperatures; and (4) lower firing enamels permit the use of thinner gauges of sheet steel because warping and sagging are greatly reduced. Enamels which have the desirable properties found in enamels at higher temperatures, such as acid resistance, weather resistance, high hardness and high opacity can be compounded in this lower range.

Discussion includes: (a) the characteristics of white molybdenum enamels, (b) the effect of composition on properties, and (c) the effect of smelting. Several typical compositions in each group studied were given.

Determination of reflectance of white enamel frit by a nephelometric method

By R. M. KING

A method for the determination of the reflectance of the complete fired enamel has been standardized and used rather extensively. This method, however, does not necessarily give any clue to the reflectance of the original frit nor any information as to the influence of various factors on the reflectance of the frit and of the complete enamel.

An attempt has been made in this investigation to develop a method for

the determination of the opacity of ground frit. Briefly, this consists of grinding and sieving a frit so that an approximately constant particle size is obtained. A sample of constant volume is suspended in a glass cell containing 10 cc. of clear kerosene and the cell is placed in a beam of light which falls on a photoelectric cell. The amount of light incident upon the cell is governed by the reflectance of the frit and measured by

the amount of current generated by the cell, and compared to the current generated by the light passing through clear kerosene alone. The instrument used was a Cenco-Sheard-Sanford Photometer.

Values obtained in this manner were compared with values obtained from standard plate tests in which only clay was added. In order to determine the influence of firing and of clay additions similar tests were made

on the frit and frit-clay mixtures fused at 1500° F.

The reflectance of untreated frits showed a reasonably high correlation with plate reflectance with the exception of frits of the zircon type. The

reflectance of the latter is known to increase markedly when the frit is fused.

The reflectance of the fused frits and frit-clay mixtures showed a marked correlation with the plate

reflectance.

Results indicate that the addition of clay does not significantly increase the reflectance of enamels, but the firing of enamel does.

The properties and uses of several clays in porcelain enamels

By R. L. Cook

The general effect of the various clays in sheet-iron ground coat and cover enamels may be summarized in the following manner:

1. In the clays tested, the chemical analysis and the physical data, such as particle size, pH or p.c.e., do not give a satisfactory basis for predicting the general usability of clays in porcelain enamels.

2. When the various clays were milled in the same ground coat frit and then fired, photomicrographs showed a widely varying bubble structure in the fired enamel.

3. Some of the clays brought about an earlier development of adherence or bond between the metal and the ground coat enamel.

4. The clays which gave a large bubble structure in the ground coat layer, when impacted with the Fall-

ing-Weight Test, gave a large fracture area, while the clays giving a small bubble structure caused a small fracture area.

5. The freshly milled ground coat enamel containing the various clays was adjusted to give: (a) a pick-up of 40 grams per square foot, thus giving a variable solids-to-liquid ratio, and (b) a specific gravity of 1.65, giving a constant solids-to-liquid ratio in the slips. The enamel slips were tested for the weight picked up after specific aging periods and the various clays were found to cause, in some cases, an increase in the weight picked up, in others a decrease in the weight picked up, while still others gave practically no change in the weight pick-up value after various aging periods.

6. At an application weight of 60

grams per square foot, the different clays caused a maximum variation of about 6 per cent reflectance in the antimony frit, 12 per cent reflectance in the zirconium frit, and 25 per cent reflectance in the clear frit.

7. The spectrophotometric curves of the various clay and frit combinations showed that the clays gave uniform spectral values in the antimony and clear frits, while in the zirconium frit a greater variation in reflectance was found in the red portion of the spectrum than in the blue or green portions of the spectrum.

8. The various clays in the antimony frit showed a marked difference in the gouging characteristics of the surfaces, while in the zirconium frit the clays caused only a slight variation in gouging as all of the values were uniformly high.

Crazing of enamel on stove tops due to heating in service

By R. L. FELLOWS

Examination of crazed electric stove tops that failed in service reveals two types of crazing. One is in the form of a network of cracks and is usually attributed to thermal shock failure; the other is in more or less parallel lines and occurs in service, apparently without any particular abuse. In preliminary tests, it was found that localized heating of the stove top causes a crossbend failure of the enamel due to flexing from the heat. The temperature necessary to cause this condition occurs below 550° F.

In testing a white enamel, it was found that as the temperature was increased, the deflection value decreased from .41" at room temperature to .05" at 700° F., when the test was made in a crossbend machine placed

in an oven. Another enamel which has a cubical coefficient of expansion of 291 as compared to 325 cm/cm/° C. for the above enamel showed a higher deflection value over the entire testing range. This indicates that the lower expansion enamel will withstand about 100° F. higher temperature than the high expansion enamel before comparable deflection failure. Deflection tests made at room temperature revealed that as the weight of application of the cover coat is increased from 40 up to 120 grams per sq. ft., the deflection value decreases from .55" to .25".

A good correlation of the deflection test results was secured by pre-stressing crossbend strips .20" in the crossbend machine and heating while under tension. It was found that the

specimen failed at an average of 520° F. which corresponds to that determined when panels were heated with increasing increments of stress and temperature. These tests indicate that stove tops that have tensile strains in the enamel due to fabrication or assembly are likely to craze in the areas of these stresses if they are heated.

Using a rimbound test specimen, it was observed that (1) the lighter the weight of application the more resistant the enamel to crazing; (2) the lower the coefficient of expansion of the cover coat enamel, the greater the resistance to crazing; (3) the heavier the gauge of metal the greater the resistance to crazing.

additional papers →

Properties of enamel slips: II (Suspension of enamel frits)

By BURNHAM W. KING, JR., HERBERT D. CARTER AND HARRY C. DRAKER

In the literature on enamels, there are numerous illustrations of the affect of various soluble salts on the properties of enamel slips. However, there are relatively few data concerning just what salts are normally present in milled enamels of the various types most commonly used in the industry.

This paper gives data as to the amount of Na_2O , B_2O_3 and F_2 to be found in the mill liquor when the following typical frits are milled:

blue ground coat, clear frit for

colors, ordinary opaque antimony, acid resisting opaque antimony, and zirconia opacified.

The effect of aging some of these slips was studied, and data is presented on the soluble salts present and the pickup weight after various intervals of aging. In making these tests, enamels were run at several different specific gravities. This was done by using the same mill addition throughout but varying the water content to give the desired specific gravity. On this test the ordinary

antimony showed the highest pickup, then the ground coat, next the zirconia, and last the acid resistant composition.

Differences were also noted in the suspending properties of the frits alone and data are given on this phenomena.

Information is also included on the effect of various soluble salts when used with clay and water in the suspension of finely ground silica. The anion as well as the cation of the salt was found to be important.

Electrostatic spraying of porcelain enamels

By JAMES B. WILLIS

A process for the electrostatic deposition of porcelain enamels on metal parts as a means of eliminating overspray losses common to the conventional methods of spray application is reported.

The process consists of charging of the spray particles in an electric field and the attraction of these particles to the object to be coated, a process* not dissimilar, theoretically, from electroplating except that in the latter case the metallic particles are suspended in a water medium, whereas with the former, the spray particles are suspended in air.

The initial investigation includes a study of materials, equipment and the technique of application. Under "Method of Procedure" are included studies of Atomization, Location of Spray Gun, Control of Fluid Volume, Effect of Specific Gravity or Water Content, Effect of Set, Effect of Fineness, Overspray and Effect of Clay Content.

The paper is heavily illustrated

with photographs, tables, charts and photomicrographs.

The following conclusions are reached:

1. The factors which make electrostatic spraying valuable in the application of organic coatings apply equally to porcelain enamel. The process can be satisfactorily used for spraying of enamels, and when properly used, produces a uniformly coated product with a minimum of loss due to overspray.

2. Although the process appears to offer an appreciable savings in material consumption, proof of this fact may be obtained only through an industrial installation of the equipment.

3. The process lends itself readily to the spraying of flat surfaces with simple flanges or to the spraying of symmetrical shapes, especially where the operation is highly repetitive.

4. In preparation of the enamel, the process necessitates no radical changes from the conventional mill

additions which might affect equipment or layout planning nor does it involve extremely fine milling of the enamel.

5. Accurate control of the physical properties of the enamel slip used for spraying in this process, especially of the set and the specific gravity or water content, is essential to the production of uniformly satisfactory results.

6. Each individual installation will require an adjustment in the number and location of the guns for most efficient operation.

* See January *finish*, "Electrostatic Spraying Offers New Possibilities for Enamel Application," by Richard E. Helmuth.

NOTE: This complete paper, together with all illustrations, will appear in a future issue of *finish* by permission of the American Ceramic Society.

Study of nickel flashing and its relation to enamel adherence

By E. WAINER AND W. J. BALDWIN

Nickel flashing as applied to enameling stock is shown to be primarily nickel. The role of nickel in developing enamel adherence is apparently bound up with the retardation of oxidation of the base iron in the enamel-

ing cycle which the nickel flash imparts.

The problem of adherence may be considered a corrosion phenomenon of the base iron as developed by the action of gases, particularly oxygen,

and other agents which may be present at enameling temperatures. The gaseous and solid equilibria are strongly affected by the presence of nickel. The evidence indicates that

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Postwar construction project plans (A progress report)

By THOMAS S. HOLDEN

There is little reason for worry about the status of postwar construction planning.

Salient facts on the situation are these:

1. Contemplated postwar projects reported by F. W. Dodge Corporation's field staff to December 31, 1944, numbered 71,564 with a total estimated cost of \$13,254,848,000.

2. Included were 25,319 projects reported in the design stage, amounting to \$6,378,486,000.

3. The list of projects has continued to grow since January 1, and is growing daily.

4. Design-stage projects to December 31 total double the dollar volume of contracts awarded during the entire year 1938 in the 37 eastern states,

the same territory for which the postwar projects have been listed.

5. The tabulation includes no deferred maintenance, repair and modernization projects, demand for which will likely predominate during the first few months after X Day.

6. While public projects predominate in the postwar listing, private projects reported in the design stage are larger in volume than the private contract volume of the year 1938. Private projects reported represent only a portion of the postwar private construction demand.

The year 1938 was cited for comparison in the above statements, because the writer believes the actual volume of that year represents approximately the amount of new con-

struction that can be effectively started in the first twelve months after X Day.

Early delays in postwar construction revival will not be due to a dearth of plans, but to four revival bottlenecks incident to reconversion to a peacetime economy: government controls (which will probably be relaxed gradually), material supply problems, price problems, and manpower problems. Part of the problem of material supply will likely be due to transportation bottlenecks.

Artificial stimulation of public works in the early postwar period would create undue competition for men and materials between public projects and urgently needed private projects, thus increasing the inflation threat at that time.

Porcelain enamel—the versatile finish

By F. L. MEACHAM

Porcelain enamel, first used as a decorative finish, found acceptance on products having utility as well as beauty because of its inherent desirable properties. It is the preferred finish on many products because of its ability to withstand heat, its excellent corrosion resistance, its ease of cleaning, and scratch resistance. Other desirable properties are the wide range of colors, the fact that it is unaffected by grease, is entirely resistant to all organic solvents, and can be made to possess acid resistance or even be made acid-proof when in contact with boiling and concentrated acids.

Because of the inert characteristic of porcelain enamel, it is the preferred material for finishing food handling and processing equipment. It is also used to a large extent in the chemical industry where acid resistance, as well as resistance to high and low temperatures and high and low pressures, is required.

Because of its excellent abrasion

resistance, it is used on some types of electrical control equipment which must be electrically insulated as well as air-cooled. The abrasive action of dirt carried in cooling air caused failure in the early types of electrical insulation.

Smoke pipe and flue linings will probably represent a large postwar use for porcelain enamel.

The essentials of a good porcelain enamel finish are:

1. The coating must be continuous on all essential surfaces.

2. The coating must have adequate coverage to give good appearance and have consumer acceptance.

3. The coating should be as thin as possible so that it is less susceptible to damage.

4. If the finish is to be exposed to acidic conditions, it should be acid resisting.

5. For certain applications it should possess adequate thermal shock resistance.

6. Regardless of the application,

the finish should be properly bonded to the base metal.

Production of porcelain enameled ware with single cover coats applied directly to the base metal appears to be a possibility of the near future, even though this system is experimental at the present time. The success of porcelain enamel, as well as any other finish, will, in the future, depend largely upon the intelligent use of trained technical personnel. We should recognize that trained technical help is a scarce article today, and it will remain so for the next several years. Have your technical help establish controls and then train someone with lesser qualifications in the routine task of seeing that these controls are followed. This will free your technical personnel for the more responsible problems dealing with over-all production. Exercising controls does cost money, but it pays a dividend many-fold.

The outlook for porcelain enamel

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Tailored to Fit

... its Products ... its Spray Materials ... its Finishing Specifications

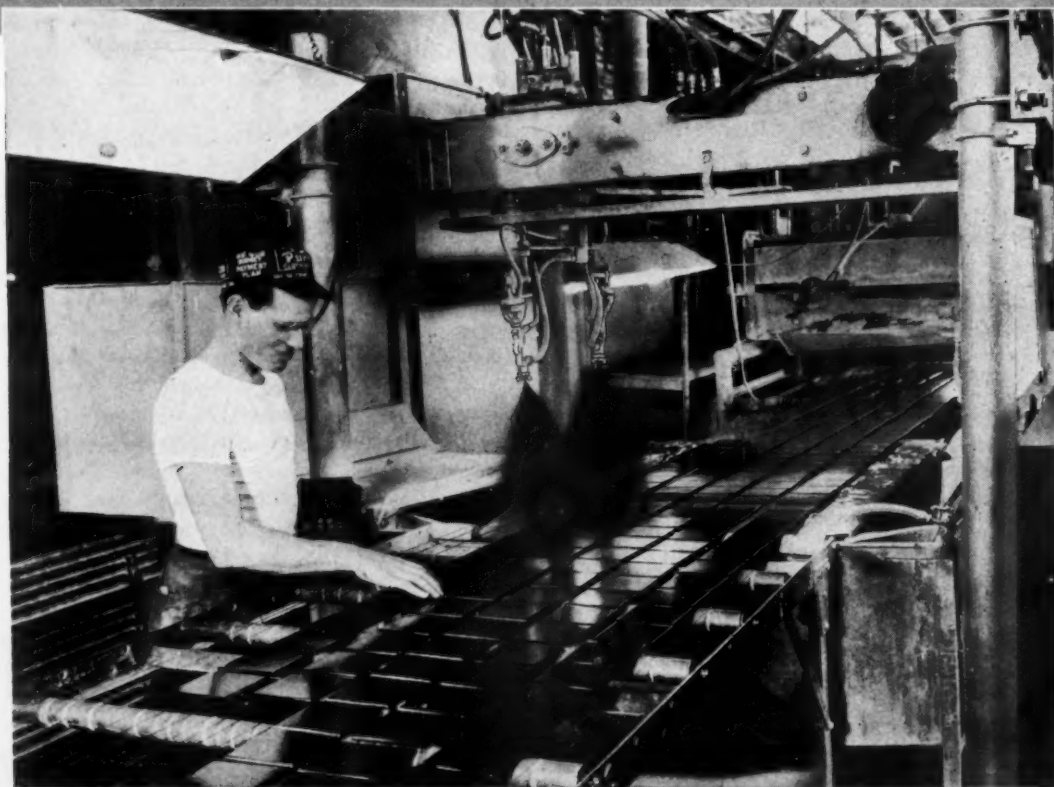
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Complete Automatic Spray Coating Installations to meet the needs of any production schedule.

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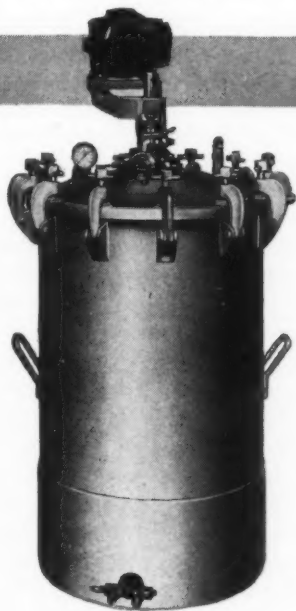
due to the characteristics of vitreous materials. When this "tailoring" is done by the largest and most experienced spray engineering staff—with years of direct contact with the spraying problems of your industry—you can be sure of better finishing service.

DeVilbiss engineers will welcome the opportunity to discuss your postwar finishing plans.

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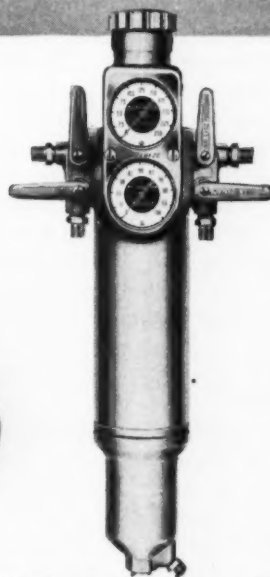
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ACS GENERAL SESSION

→ from Page 33

is bright. However, its future is entirely dependent upon the manner in

which our industry handles the problems which arise. We must of necessity continually devise improvements in the enamel coating and strive to accomplish ever-lower production

costs. If our industry handles these problems intelligently, we are certain to find new applications for this finish.

The consumer credit potential in postwar distribution

By R. H. STOUT

There is no need for anyone to tell you the oft-repeated story of how new vistas and new horizons lie before the ceramics industry. The strides you have taken in making your tremendous contribution to the war effort have but accelerated the outstanding progress you were making in the last peace time years. Brightness, lightness, durability, greater utility are all features which a discriminating, though market-hungry, public will demand. You can offer all of these in greater measure than the world has heretofore known.

There is need to pause and to remember that in business there is no clean cleavage which separates one era from another, no period ever so new and different that the lessons of the past can be neglected or forgotten.

You must be particularly cautious lest you be blinded by the expanse of your promised markets. You must not be blinded to the lessons of the past and the necessity of moving forward within the framework of a careful plan to insure against the interruption of your work and your enthusiasm.

One of the fellow travelers you will have is Consumer Credit.

We have only to glance back within the memories of most of us to find proof of that contention. In the dy-

ing days of the old century only one manufactured article had really wide distribution. That was the sewing machine. And, the distribution there was primarily in the make, which was pioneering the field we now know as sales finance.

The radio has come closer than any other product of the manufacturer's skill to market saturation, largely because it started off on the principle that the buyer could pay as he used.

Tremendous increase in consumer credit is an absolute essential unless the future of the country is to take a direction which no qualified student has forecast. It is an essential because —

1. Goods production, job production, social aims will be abetted through the instrumentality of consumer credit as the chief solution to the stifling bottleneck historically occurring at the demand or distribution level;

2. If reconversion is to reverse the process of the conversion movement, the use of private credit, of which consumer credit is an important segment, must be a feature;

3. Inflation control and government solvency can be served by dependence on consumer credit;

4. The retail distributor no longer has adequate capital to be his own

consumer credit carrier, any more than he has sufficient capital to keep him out of the banks the year round for his commercial loan needs — nor is there further reason for him to be both a lender and a vendor.

These reasons for belief in a greatly expanded consumer credit potential do not include the more obvious and oft-repeated ones. Among these are the greatly increased number of banking outlets newly awakened to the importance of the installment buyer and borrower; the obsolescence of and hunger for consumer durables; the fascinating prospect of new gadgets, new techniques, new color combinations and new lines; the greatly enhanced elasticity of consumer credit itself and its reduced cost.

To you, in your field of endeavor, at this point when you are about to embark into what may be reasonably called a "commercial promised land," this all adds up to one thing. One of your fellow travelers will be that segment of finance we call consumer credit. It will be a worthy fellow traveler to such a great and promising industry as your own. It can open doors to you and a mutual relationship, based on understanding and mutual dependence, can make the road easier and the trip more speedy.

The ceramic industry and the returned service man

By CAPTAIN ARTHUR J. BLUME

This paper discusses some of the problems of returned service men. It outlines the changes in mental attitudes caused by military service. It further explains that the present members of the ceramic industry will all have some contact with returned men and that there should be some understanding of the service man's prob-

lems. The fact that the average returned man is not a mental case but that military service has left its mark is pointed out. Adjustment to military life and readjustment to civilian life are discussed.

With regard to ceramic engineers, it is stated that the age and previous industrial experience will have con-

siderable bearing on the effect of military service. The younger man will be somewhat dependent for a while after leaving service. He may be somewhat resentful of authority because of having been completely dominated by his military superiors. Military life will have benefitted him

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MAY • 1945 finish

NEWS

Noted technical author and educator joins Battelle staff

Dr. J. R. Van Pelt, Jr., noted for his educational pioneering, and until recently technical director of the Museum of Science and Industry, in Chicago, has joined the staff of Battelle Memorial Institute, Columbus, Ohio. According to an announcement by Clyde Williams, Battelle director, Dr. Van Pelt will head Battelle's program of research education.

"This program of research education," said Williams, "is a familiar field for Battelle Memorial Institute. Thousands of veterans are learning that scientific manpower is one of the country's key assets, and that the supply of such men is now, and will remain for years, critically short. Battelle Memorial Institute, in cooperation with other educational institutions, will give a few specially qualified veterans who have completed their college work the finest possible training in scientific research."

Mr. Williams pointed out that the enlarged program is also designed to add to the country's store of scientific knowledge. "America has been so busy in the last five years applying the old familiar laws of nature to military purposes that we have had too little time for discovering new scientific laws. Building new post-war industries and products for mass consumption depends on a steady

flow of new basic knowledge. Furthermore, this new knowledge is vitally important for national preparedness in the future."

Walter J. Conlon dies

Walter J. Conlon, 57, founder and former president of the Conlon Corporation, Chicago, died in Manistee, Michigan, April 7, and was buried in nearby Onkama, Michigan, on April 11. Mr. Conlon had retired in 1940.

Tom Conlon, one of four surviving sons, is vice president of the Conlon Corporation; Richard Paul and Edward J. have been serving in the armed services; and Walter J., Jr., is an electrical engineer with the Norge Company at Muskegon, Mich.

A.W.I.M.A. president on "Your America" program

Women's clubs, parent-teacher associations and similar organizations owe their existence and growth chiefly to the development of labor-saving devices for the home, Louis C. Upton, president of the American Washer and Ironer Manufacturers' Association and head of the 1900 Corporation, St. Joseph, Mich., told a radio audience recently over a coast-to-coast network.

"With the invention of the modern washing machine, women began to obtain and enjoy a degree of free-

dom they had never known before, and began to engage in activities of tremendous benefit to American life," Mr. Upton asserted.

Representing the Association, Mr. Upton was guest speaker on the Union Pacific Railroad's Mutual network production, "Your America," in one of a series of programs saluting the nation's leading industries. He spoke from Omaha, Neb., where "Your America" originates each week and where headquarters of the railroad are located.

Hotpoint to merchandise the "complete home laundry"

Automatic washing machines and electric tumbler dryers were announced as postwar additions to the home laundry line of Edison General Electric (Hotpoint) Appliance Company, in a wartime "meeting-by-mail" bulletin sent to regional and district sales managers by Fred C. Margolf, manager, home laundry sales division. The field sales executives were told that the new appliances would be ready as soon after reconversion as manufacturing conditions permitted and that they would round out a "complete home laundry" merchandising presentation under the company's selective dealer activity.

Noting that in the past the washing machine has been the only piece of home laundry equipment sold to almost 90 per cent of the people doing home laundering, and that most of the drudgery associated with home laundering of clothes was due to "hanging out on lines after carrying up basement stairs, with subsequent hours spent in hand ironing," a planned home laundry center was urged.

Margolf's report cites figures to show that less than 15 per cent of homes own an ironing machine; not more than one per cent use a clothes dryer, while 65 per cent of the nation's wired homes own washers. He said: "The economy, convenience and health value of home laundry equipment makes it the most wanted of all types of home equipment for post war . . .

"The future of the home laundry appliance business rests in planning for complete equipment that will give women a light, comfortable work center, where work can be done pleasantly and quickly . . .

"Post war home laundry dealers will sell water heaters as part of the equipment . . ."

Ferro doubles engineering department facilities

Ferro Enamel Corporation announces that the company's engineering department facilities at Cleveland have recently been doubled, with E. W. Dany in charge as chief engineer. Drafting room area has been increased 100% and the newest type lighting and ventilating equipment installed. Office space has also been increased.

F. S. Markert, company vice president, reports that a recent survey of the company's furnace installations shows that Ferro has installed 125 continuous furnaces and 500-box type furnaces since organizing their engineering and furnace building department.

Conlon directors approve plant expansion

Plans of the Conlon Corporation, peacetime manufacturer of household washers and ironers, for post-war plant improvement and expansion, increased production and a stepped-up sales program to be put into action as rapidly as the war effort and the labor situation permit were approved recently at the annual meeting of the directors and stockholders.

Bernard J. Hank, reelected president and chairman of the board, announced completion of "another profitable year." Others reelected were I. N. Merritt, vice president and general manager; Tom Conlon, vice president in charge of sales; H. E. Angier, treasurer; and directors E. J. Morrissey, general sales manager and director, Chicago Rivet and Machine Co.; L. J. Schneider, vice president, general manager and director, Schneider Metal Manufacturing Co., and E. J. Seifert, chair-

man, president and director, Pettibone-Mulliken Company.

Kalamazoo Stove revamps both products and merchandising policies

The Kalamazoo Stove & Furnace Company, after the war, will inaugurate an entirely different merchandising program than the company has had in the past. To begin with, the mail order catalog will be discontinued, as well as the old slogan, "A Kalamazoo Direct to You."



Kalamazoo's President Blakeslee

Starting with newly designed Kalamazoo products, all sales efforts will be through department stores, dealers and Kalamazoo's own factory-owned stores. While the company had nearly 300 factory-owned stores before the war, these were restricted to an area comprising 14 eastern states and there was little or no representation in the larger metropolitan cities. After victory, the company is to be represented in practically every state and will enter the large city markets as well as small town and rural communities.

A. L. Blakeslee, president, had this to say in the company's latest annual statement:

"While the winning of the war is our prime objective, we have concrete plans for the post-war expansion of our stove and furnace business that will go far beyond anything we have heretofore undertaken in manufacturing and merchandising. The great backlog of consumer de-

mand for stoves and furnaces that has grown since Pearl Harbor, and the reservoir of consumer savings accumulated against that demand, suggest a high level of activity in our business for some time. To entrench ourselves more firmly with our 2,000,000 users and to enhance our position in the industry, we sincerely believe that we should make advance designs available to the public at the earliest time practicable."

New Kalamazoo product designs have been created by Walter Dorwin Teague and Jack Morgan, industrial designers, according to a company executive.

Foundry Equipment Co. wins Third White Star

The American Foundry Equipment Co., 555 S. Byrkit Street, Mishawaka, Indiana, has been awarded its third white star to be added to its Army-Navy "E" Production Award Flag originally awarded on March 20, 1943.

The company believes this to be the first third award renewal star to be presented in the foundry equipment manufacturing field.

DeVilbiss wins 4th Army-Navy production award

For the fourth time employees of The DeVilbiss Company, Toledo, Ohio, have won the Army-Navy "E" Award, according to advice recently received.

DeVilbiss workers received their first citation in December, 1942, and for maintaining their record since that time have earned three supplemental awards which adds the third star to their Army-Navy "E" flag.

Third Army-Navy Star to Tappan

The awarding of a third renewal of the coveted Army-Navy "E" flag to the Tappan Stove Company has been announced by Paul R. Tappan, president, following receipt of a letter from Admiral C. C. Bloch, chairman of the navy board for production awards.

The first renewal star was awarded the Tappan firm in Dec. 1943 and the second in June 1944.

Ashtabula to get new General Electric plant

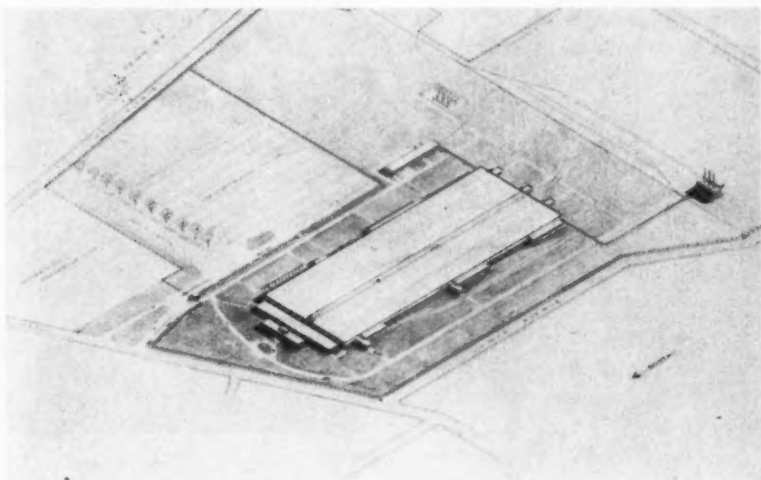
23 acres of factory buildings to produce home freezers

A new General Electric Company plant devoted to the manufacture of home freezers is to be located at Ashtabula, Ohio, according to a recent report from Bridgeport. The plant may also be used for the manufacture of domestic refrigerators. The company expects the field of home freezing and storage to greatly expand in postwar years. As plans stand now, the plant may employ approximately 1,500 persons, both men and women.

cost power and sufficient supply of high-type manpower.

The new plant will be served by both the New York Central and Pennsylvania railroads. Tentative plans of the railroads already have been worked out, but definite layouts have not been decided on until all details for the plant have been arranged.

Some idea of the size of the new project may be obtained from the fact that the first unit of the plant will cover about 15 acres under one roof.



This drawing shows the 100-acre tract where the new G.E. home freezer plant is to be located — 23 acres of factory buildings.

The location of the plant at Ashtabula, according to a reporter for the Ashtabula Star Beacon, was the outgrowth of careful consideration of a wide range of factors. According to the paper, there is a unique combination of essentials which are important to these electrical household appliances. Among them are: Fine rail and water transportation facilities and possibilities for development of air routes, a central location with respect to the major markets of the nation and the world, unlimited supply of fresh water, ideal recreational advantages for workers, progressive and up-to-date school facilities, including a vocational school for the training of skilled workers, a low tax rate, abundant natural resources close at hand, adequate supply of low

The second unit will cover an additional eight acres under one roof, making 23 acres in all to be occupied by the two principal factory buildings.

The remaining 77 acres of the 100 acres of land taken under option by G.E. will be used for a large parking lot for employees, future warehouses, garage, boiler house, sub-station and railroad sidings.

General Electric's market survey on home freezers forecasts a sale of a million units in the first two years after the war. It reported that one packer plans to spend \$2,000,000 in promoting the sale of packaged frozen meat, and a national dairy plans to consign frozen food to customers and charge them as the supply is replenished.

The study for this product indi-

cated that household units will be on the market for less than \$175 and not only will provide better food with less frequent shopping trips, but promises to save on grocery bills by permitting a housewife to lay in long-time supplies when fruits, vegetables, fish and meat are seasonally cheapest.

The proposed General Electric home freezer is a four-cubic foot model of the lift-top construction. Wire racks in the freezer will make food stored in the bottom readily accessible.

O. Hommel Company receives Army-Navy "E" Award

The men and women of the O. Hommel Company, Carnegie, Pa., have been awarded the Army-Navy "E" Flag as recognition of their performance on the production front, and the quality and quantity of material produced by them. The flag and "E" pins were presented to the O. Hommel Company men and women Tuesday, April 10.

Col. Robert C. Downie, Dist. Chief of Pittsburgh Ordnance District made the Award presentation to Ernest Hommel, president of the O. Hommel Company, and Marcus Gibb, representing employees. Commander C. E. Egeler, U.S.N.R., Officer in Charge of the Navy Inspection Office, Munhall, Pa., presented the pins.

The changeover from peacetime production to ceramic colors and frit for china glass and enameling was a complete conversion, and complete new manufacturing facilities had to be provided to produce the millions of pounds of powdered metals that have gone to the armed forces all over the world. All the products manufactured by the O. Hommel Company for the Army and Navy are reported to have been tough assignments that were considered too difficult to undertake by many war plants.

Norge holds meeting in Mexico City

Mexican and Central American distributors of Norge commercial and household appliances met with offi-

cials of the company in Mexico City recently to lay plans for full-scale resumption of trade as soon as conditions permit, it was announced by Arch Black, manager of export sales for the Norge division of Borg-Warner Corporation.

R. W. Gifford, vice president and assistant general manager of Norge, outlined the company's postwar manufacturing plans which call for decentralization of operations.

Alan P. Tappan promoted to full colonel



Advancement of Alan P. Tappan, former vice president of the Tappan Stove Company, Mansfield, from the rank of lieutenant colonel to that of a full colonel has been announced in Washington.

In his early military career, Col. Tappan saw service with Co. M on the Mexican border and later transferred to the Army Air Forces during the first World War.

He was commissioned a second lieutenant after attending Officers Candidate School at Ft. Benjamin Harrison, and in 1918 became an army flying instructor, serving in Texas and California. He was later in charge of flying of the 312th squadron at Bolling Field, Washington, D.C.

Col. Tappan entered active service for World War II on July 18, 1942, when he was commissioned a captain in the procurement division of the Army Air Forces. First stationed at Wright Field, Dayton, Ohio, he went

to England late in 1942 and while there was commissioned a major. Returning from England, he was promoted to lieutenant colonel in the fall of 1943.

With his new commission, Col. Tappan will remain in Washington, D.C. with the Army Air Forces procurement division.

It is reported that William TenBusch, formerly with Chicago Porcelain Enamel Company, has joined the organization of The Chicago Hardware Foundry Company, North Chicago, Illinois.

Mr. TenBusch is well known to many enamel users in the Chicago territory through his sales work with Chicago Porcelain.

Ferro Enamel Corporation aids in production of new Tokyo bomb

The following appeared recently in many papers throughout the country. In this instance the Cleveland Press is quoted.

"The Army took its M-69 incendiary bomb apart recently to explain what makes it spread jellied fire over Japanese cities.

"Chemical warfare experts held a press inspection tour in the plant of the Unexcelled Manufacturing Co., one of the manufacturers of the M-69.

"The 'heat' is shipped to the Staten Island plant in metal containers. They contain thickened, or jellied gasoline, the secret of the M-69.

"Unexcelled's workers tie four 32-inch tail streamers on the jelly fire containers to give them direction in descent. Then, two transparent plastic casings containing magnesium and black powder are attached to the containers.

"A fuse set to explode on contact is added. The fuse ignites the magnesium and powder, and the resultant explosion scatters flaming jelly.

"The Army said the bombs are racked in clusters of 14 to a six-sided frame which falls apart after it leaves the bomber. The 14 M-69's — 19 inches long and three inches in diameter — separate in midair and hit the ground well scattered."

It is interesting to note that the Ferro Enamel Corporation aided materially in the production of this type of bomb. For the last two years they have held research contracts with the National Defense Research Council for the development and improvement of a material used to produce the jellied gasoline mentioned in this article. Beside the research contract they have also been one of the large producers of this material for the Chemical Warfare Service.

Millmann is new president of Geuder, Paeschke & Frey



At a meeting of the Board of Directors of Geuder, Paeschke & Frey Co., Milwaukee, Wisconsin, on March 29, 1945, the following corporate officers were elected.

President H. F. Millmann
Vice President . . Capt. A. K. Paeschke
Vice President & Treasurer

. F. T. Frey
Secretary & Ass't Treasurer

. A. J. Lehmkuhl

C. H. Voss and H. N. Forsberg continue in their previous capacities as vice presidents.

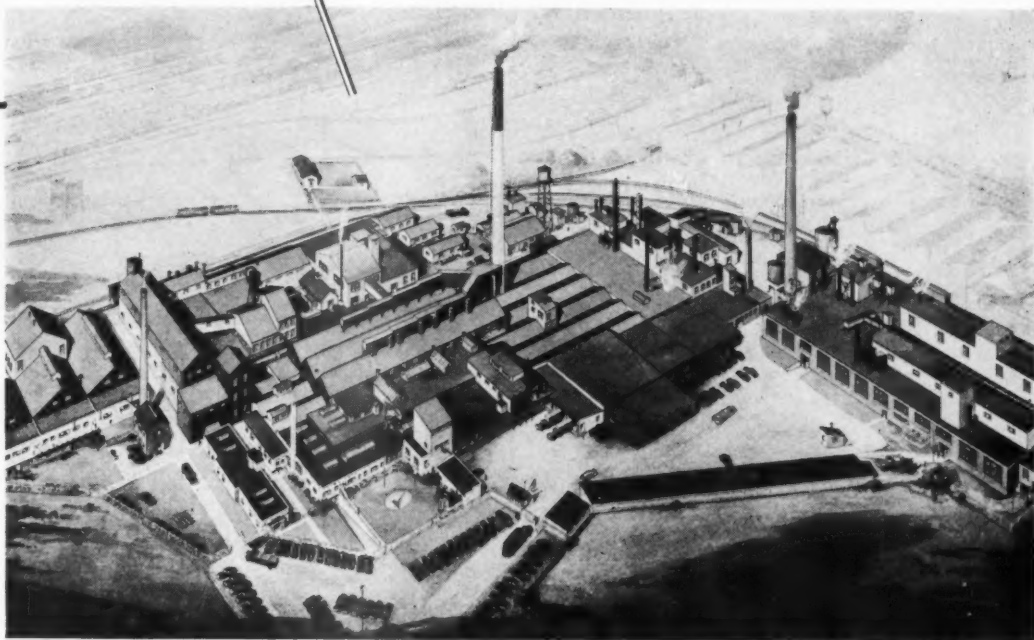
The election of Mr. Millmann follows the recent death of Frank A. Frey, former company president. (See April *finish*.)

Attention, store front producers!

The National Electric Sign Association reports that repeated surveys made among retailers indicates that they will spend well over a billion

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MAY • 1945 finish



FIVE TIMES IN THREE YEARS...

Yes, *five* times in the past 29 months, Undersecretary of War Patterson has honored the employees of the Ferro Enamel Corporation at Cleveland for meritorious service in the production of war materials.

Naturally, we are proud of this record — proud of the *Ferromen* and *Ferrowomen* whose individual and collective efforts have earned *five* consecutive Army-Navy "E" Awards.

Someday soon, these capable executives, technicians and craftsmen will turn again to the production of peacetime products. Strengthened and broadened by their war experience, they will bring you improved ceramic, porcelain enameling and other materials. In short, they'll *continue* to render a "meritorious service"—for our customers in peace, as for the Army and Navy in war.

F E R R O E N A M E L C O R P O R A T I O N

4150 E. 56th Street



Cleveland 5, Ohio

→ from Page 40

dollars to make their stores streamlined, more efficient and attractive. One of the first changes indicated on the list of "What they will do" is the improvement of store fronts.

In addition, many more millions will be spent on the construction of new stores. In this connection Charles Burkhart, chairman of the Promotional committee for NESA, is developing plans to broaden the current year's promotional activities.

The committee's work will include direct mail to large sign users, personalized imprint mailing pieces for association members, cooperation

with trade publications, and the development of data for store front manufacturers, architects and organizations undertaking modernization in building programs.

The "brownout" situation

The NESA is continuing its efforts to secure a modification of the WPB Order U-9 to permit signs in show windows to be lighted during certain hours each night, or on specified nights when a place of business is open. An appeal has been made to the Director of War Mobilization for a reasonable modification of the order.

Twin City section of ASRE meets



The faculties of the University of Minnesota and Wayne University of Detroit took over the Twin City Section of the American Society of Refrigeration Engineers for a meeting at the Saint Paul Athletic Club.

Guest speaker was Dr. S. A. Larson, Professor of Wayne University, who is shown above shaking hands with Dr. F. B. Rowley (left), Head of the Mechanical Engineering Department and Director of the Engi-

neering Experimental Station at the University of Minnesota. Looking on are Mr. C. E. Lund, formerly Associate Professor of Mechanical Engineering, Assistant Director of the Engineering Experimental Station and now Director of Research of the Seeger Refrigerator Company, and Dr. R. C. Jordon (right), Associate Professor and Director of Industrial Laboratories, University of Minnesota.

Uhler to new position

It was reported that Otto V. Uhler, formerly in charge of the engineering department of Porcelain Products Company, Cicero, Illinois, peacetime

producers of architectural porcelain, has recently been made chief engineer of a new plant of the Illinois Watch Case Company in Independence, Kansas. Mr. Uhler joined the

latter company, whose home plant is Elgin, Illinois, as assistant chief engineer in October, 1944.

The Independence plant is currently starting production on mortar shells and bombs.

New Cowles representative



The Cowles Detergent Company, Cleveland, Ohio, announces the appointment of Henry G. Wall, Buffalo, New York, as Cowles technical man to handle the technical service work for their Metal Cleaner Department in New York state.

Mr. Wall, who has recently been honorably discharged from the Army, was educated in Buffalo Schools and Genesee Wesleyan, and has covered the New York State industrial field for a number of years as a technical engineer on surface coatings and finishes.

Pressed Metal Institute holds annual meeting by mail

The annual meeting of the Pressed Metal Institute, which was scheduled to be held in Cleveland early this year, was held by mail in compliance with the request of the Government to cancel projected meetings whenever possible. Reports were mailed to the membership from 829 Union Commerce Building, Cleveland 14, Ohio.

According to F. C. Greenhill, president, one reason why it was possible to omit the regular meeting this year

to Page 45 →



FOUNDATION FOR A FINE FINISH

...for top product quality, start with Toncan Enameling Iron

The metal under the finish plays a big part in determining how those enameled sheets look when they come from the furnace. And the men who insist on starting with Toncan Enameling Iron always seem to get better enameling results.

Toncan Enameling Iron Sheets are made to start flat and stay flat. They won't warp or sag after repeated firing, regardless of sheet size. Their enamel-taking qualities also help to produce better-looking, longer-lasting finishes at lower cost.

The brand of sheet metal you use is a big factor in other operations, too. Toncan Enameling Iron is preferred also by many vitreous enamellers for its

fine fabricating, welding and deep drawing qualities.

When specially processed for workability, it takes *any* type of fabrication quickly and cleanly, and works *uniformly*. When processed for deep drawing, it flows smoothly into the deepest draws without wrinkling or cracking. When made for welding qualities, it produces strong, clean welds at top speed.

So, for better workmanship, fewer rejects and lower production costs, start with Toncan Enameling Iron.

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GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic

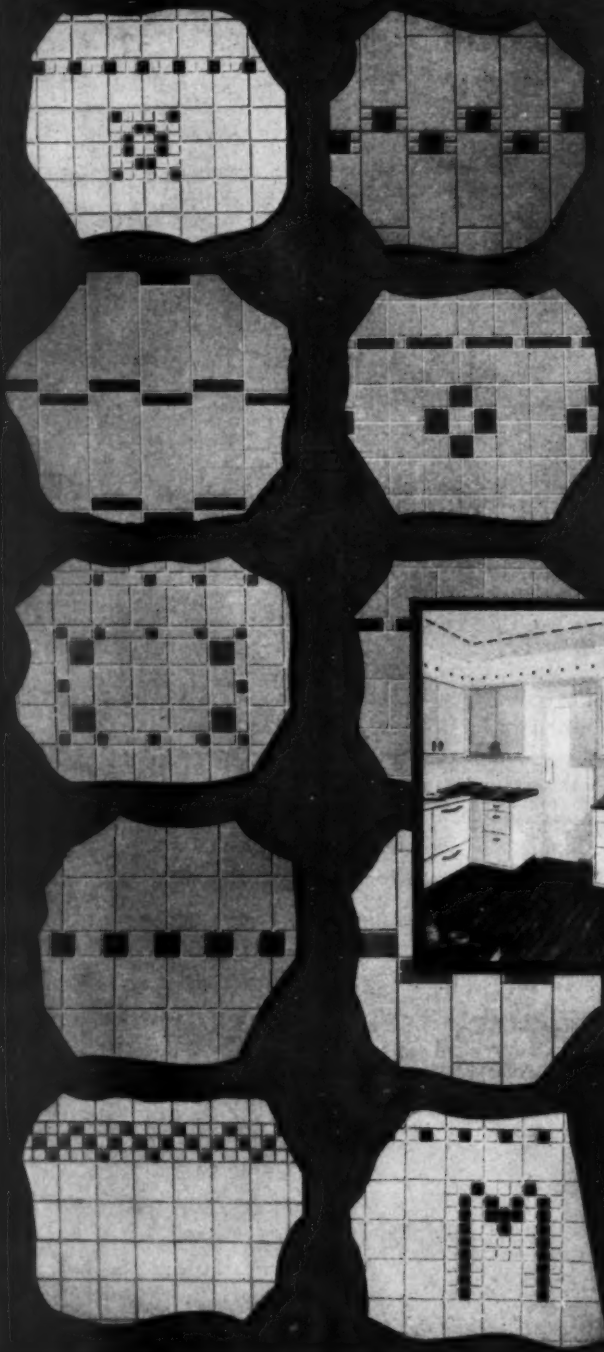


TONCAN ENAMELING IRON

Reg. U. S. Pat. Off.

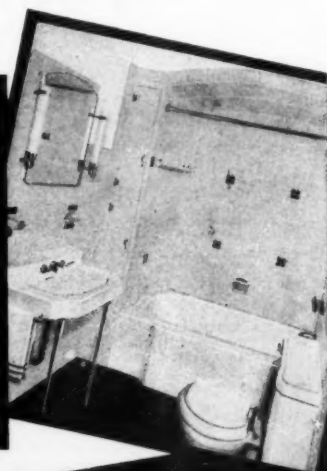
Only Porcelain ^{ON} STEEL Tile

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Create your own decoration with Veos Porcelain on Steel Tile. Individual treatments . . . your personal ideas. Walls and ceilings unlimited in distinctive beauty. Veos alone provides the varied tile sizes to make this possible. And it has never been possible before. Endless combinations of varied size arrangements . . . 12 ideal colors to enhance the unique effects. No muss or fuss in installation. Takes *half* the usual time . . . new work . . . or right over old construction. No extra charge for colors. Write for further information. Clyde Porcelain Steel Corporation, Clyde, Ohio.

VEOS PORCELAIN ON STEEL TILE



10 Big Advantages

For Residences, Commercial and Industrial Buildings, Institutions

- Installs in *HALF* the usual time
- No extra charge for colored tile
- Light weight . . . ideal for new work or remodeling
- Upkeep at a minimum
- Quick, easy servicing
- Won't crack or craze
- Won't color-fade
- Won't loosen
- Won't warp or sag
- **GUARANTEED FOR LIFE OF BUILDING**

→ from Page 42

rests in the fact that the P.M.I. is now organized on a district basis. Regular district meetings keep the Institute's membership active and in touch with current developments. Mr. Greenhill said the district meetings during past months had been largely attended and the programs received with enthusiasm.

C. R. E. Merkle, manager, Technical Sales Development, E. I. du Pont de Nemours Company, was the principle speaker at a recent District Meeting of the Pressed Metal Institute held in Philadelphia. J. H. Robins, president, American Pulley Co., presided as chairman. More than 90 local members of the Institute were present. Mr. Merkle spoke on "The Protection and Decoration of Pressed Metal with Organic Finishes."

Walter C. DeMaris, business manager of Heintz Manufacturing Co., was elected chairman, and W. A. Gorrell, president, E. J. McAleer & Co., vice chairman of the Philadelphia District for the current year.

R. W. Glasner, president, Clearing Machine Corporation, was the principle speaker at the recent District Meeting of the Pressed Metal Institute held in Toledo. Mr. Glasner spoke on the relationship between the stamping industry and the manufacturers of modern presses.

Frank Lynch of Reynolds Metal Company presented a moving picture, entitled "A Recital of Faith," a running narrative of all the operations of the aluminum industry ranging from the mining of bauxite in Arkansas to the actual delivery and use of aluminum to the fighting forces.

Tom J. Smith, executive vice president of the Pressed Metal Institute, reported briefly on the expanding activities of the Institute. More than 50 local members of the Institute were present — Walter T. Baird, The Toledo Pressed Steel Co., acting as chairman.

Henry Brehm dies

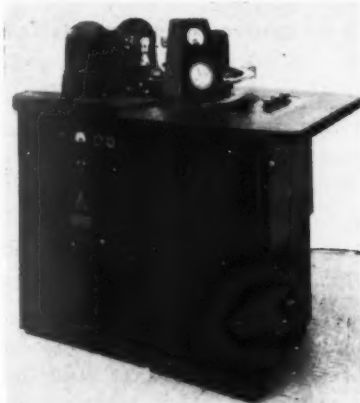
News comes to *finish* of the death

of Henry A. Brehm, who for many years was president of the Baltimore Enamel and Novelty Company, Baltimore, Md., and was one of its founders. In the new organization at Baltimore Enamel, he was chairman of the Board.

Mr. Brehm passed away on Tuesday, April 3.

INDUSTRIAL SUPPLIES AND EQUIPMENT

Geiger-Counter X-Ray Spectrometer



In a new eight-page condensed catalogue, called "NORELCO Electronic Products," the North American Philips Co., Inc., 100 E. 42nd Street, New York, include an X-Ray Spectrometer which is said to utilize an entirely new method of making quantitative and qualitative analyses of crystalline substances.

According to the manufacturer, by improving a direct-reading method, the Spectrometer reveals the elements present and determines the state of chemical combination in a given material. Identification of some unknown substances is said to have been made in approximately ten minutes by the direct-reading method.

New "Air Conditioned" Welders Helmet

To give welders complete relief from obnoxious fumes, a new "air-fed" welding helmet has been designed by a group of doctors and safety engineers. The helmet was originated by the Pullman Standard Car Manufacturing Co., Chicago, with the aid of the Northwestern University Medical School.

June Finish

Don't miss reading your copy of *June finish*. It will contain another plant story on how a jobbing shop has successfully maintained production during wartime on essential enameled products — an important story on welding — and many other features.

After tests in large plants, it is reported that the new helmet reduces worker fatigue and improves worker morale. Production increases also result, according to the test results.

Clean, fresh air is fed into the helmet, through a supply tube encircling the lens holder. Air flows along the shell and travels to the outer edges. The directional flow of the fresh air is said to prevent stale or fume-laden air from entering.



The production model is termed the Cesco "Air-Flow" Welding Helmet. For further information, write Chicago Eye Shield Company, 2300 Warren Blvd., Chicago 11, Illinois.

Industrial Publications

Thermostatic control booklet

In a new booklet, "Thermostatic Controls", just announced by Westinghouse seven types of bi-metal thermostats to fill a wide range of applications for the automatic control

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adherence development is a function of the oxygen pressure or concentration at enameling temperatures, if the ability of the enamel to dissolve or react with the products of the oxidation is assumed.

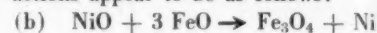
The evidence indicates that the lower oxide, FeO, is the important oxide for adherence and that nickel, by its restrictive affect on oxidation of the base iron, tends to insure the

formation and stabilization of FeO. Evidently when adherence develops both nickel and iron are oxidized to NiO and FeO respectively at enameling temperatures. If higher oxides are formed before the glass fuses, adherence is lost. The presence of Fe₃O₄ and Fe as shown by other investigators may be explained by the fact that FeO on cooling decomposes into Fe₃O₄ and Fe at about

600°C according to the equation:



In the presence of Ni, these reactions appear to be as follows:



If the nickel concentration is low, reaction (a) predominates; if the nickel concentration is high, reaction (b) takes place. The actual reactions in practice are probably variable between reaction (a) and (b).

An evaluation of one-coat enamels for kitchenware

By LEON J. FROST

Various enamels applied in one coat to the standard two quart pudding pans used by the Enamel Utensil Manufacturers' Council and to flat

plates are compared as to acid resistance, thermal shock resistance, impact resistance, surface resistance, etc. Most of the tests are according to the

E.U.M.C. procedure.

Compositions and various comments are given.

Titanium steel for vitreous enameling

By E. WAINER AND G. F. COMSTOCK

Steel containing sufficient titanium to combine with all of the carbon does not react with vitreous enamels like ordinary low-carbon steel or ingot iron so that white cover-coat enamels, without a ground coat, can be fused on it without blistering or black specking. The titanium content must be more than 4.5 times the carbon content. This steel has been made commercially by the basic open-

hearth process, and the requirements for successful manufacture are explained. It is of excellent quality for deep-drawing, and it has unusually good sagging resistance at enameling temperatures.

Preparation of this steel for successful enameling requires careful attention to details, which are explained. Proper pickling and rinsing are especially important. Nickel flash-

ing to the correct degree is generally essential, with most enamels, for satisfactory adherence. Single-coat white enameling is possible with this steel under ideal conditions, but, in general commercial practice, two half coats are preferable as insurance against defects that are not due to steel quality.

The NBS ceramic coatings for exhaust systems

By W. N. HARRISON

Work on ceramic coatings for steel, designed to protect the metal against corrosion under operating conditions of temperature and thermal shock entirely beyond the range involved in such uses as enamels on kitchen utensils was begun at the National Bureau of Standards in 1942. The development of these coatings was continued during 1943, and at the request of the armed services, the application of such coatings specifically to the exhaust systems of aircraft engines was studied.

In June, 1943, a report was made to the armed services and to a number of companies in the enamel and aircraft industries which had cooperated, in which the superior performance of coatings which had been de-

veloped in that study, as compared with the conventional type of porcelain enamels, was strongly indicated. One of the coatings described in that report was designated as NBS No. A-19, and exhaust stacks with this coating have since been brought into regular production for use on a number of models of aircraft. This type of coating has also been specified for certain vehicles by the Army Ordnance Department, which also has under consideration the extension of its use to include a large percentage of the vehicles manufactured for the Army.

Somewhat different ceramic coatings developed by the National Bureau of Standards have been specified by the Navy Department, Bu-

reau of Ships, for use on certain craft equipped with large wet mufflers and others having dry mufflers. A cooperative project between the Bureau of Ships, the Naval Engineering Experiment Station, and the Bureau of Standards is under way for the purpose of further development of ceramic coatings for wet mufflers.

This completes the resumes of Enamel Division papers. In June Finish we will print the resumes of selected papers from the Materials and Equipment Division program. A few selected papers of prime importance to enamellers will be presented in their entirety following their publication by the American Ceramic Society and release to the trade press.



Given his choice . . . a control or a fireball pitcher . . . the manager's selection will normally be control, for he knows what he can depend upon The "Lo-Hi" pH Process of chemically cleaning steel, preparatory to porcelain enameling, makes practical a control in the pickle room that gives management the know-what-to-plan-on the rest of the way in production. A comparatively small appropriation for this department (the bottle neck of most plants) will pay handsome dividends all the way down the line The findings of our laboratories and our experience in solving this problem for many manufacturers, is at your disposal.

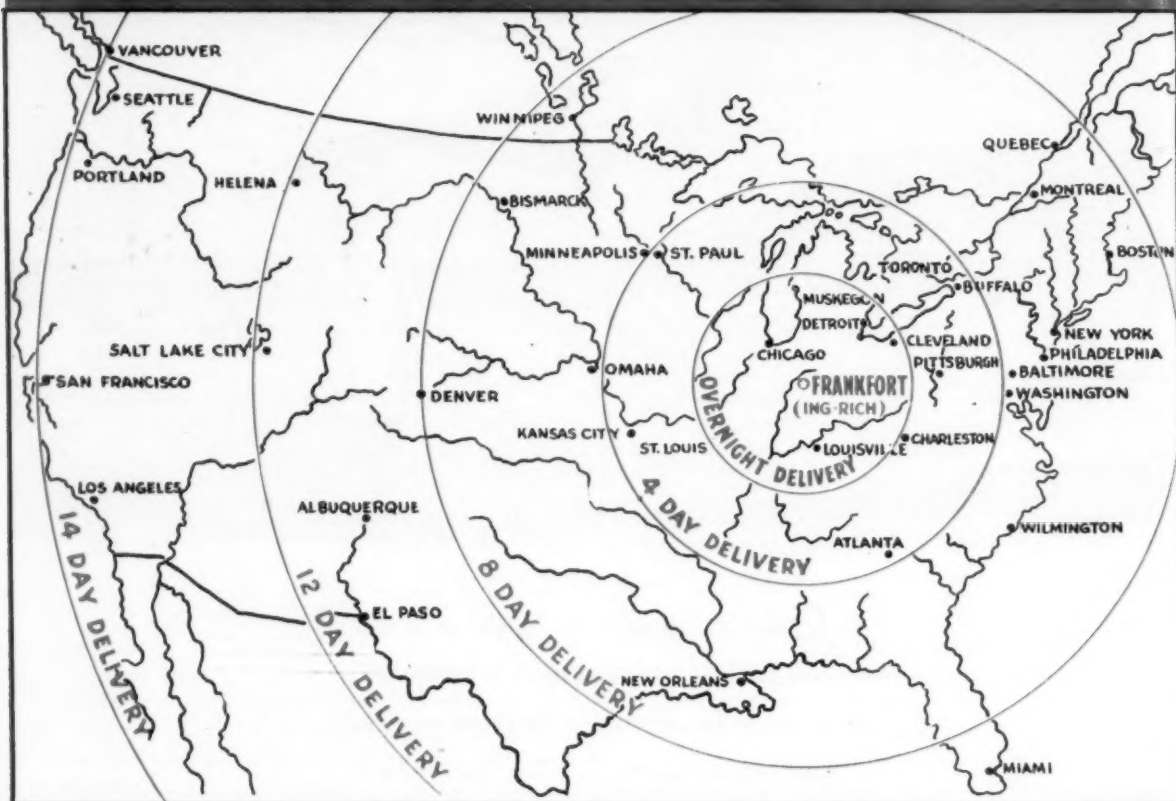


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If you are located within the other areas shown, you can expect delivery on carload shipments of Ing-Rich frits in the number of days designated. Frankfort, the home of Ing-Rich, is served by five railroads which spread out from Frankfort like the spokes of a wheel, insuring direct shipments to any point on the compass.

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A COMPLETE ENAMELING SERVICE

The WASHINGTON ROUND-UP

By WILFRED REDMOND

The statement by Chairman J. A. Krug of the War Production Board that cutbacks of about 12 per cent in major military programs will follow the end of the European War focused the attention of industries using finishes on the question of how their products will stack up against the many other civilian goods in the competition for basic materials, such as lead, steel, brass and chemicals, that will accompany reconversion.

The users of porcelain enamel are not expected to be handicapped in their civilian production programs by chemicals, but steel may be hard to get for several months after V-E day, Washington circles believe.

Refrigerators, stoves, etc. in line for allotments — signs questionable

A list of civilian products which are now in such short supply as to endanger the war-supporting economy is being prepared by WPB as a guide to its divisions in handling the allocation of materials to industry while the Pacific war goes on. Railroads, oil, public utilities and containers will be given highest preference in the distribution of the first 1,500,000 tons of steel which will be made available through military cutbacks. Refrigerators, stoves and other consumer durable goods which have been produced in limited quantities under "spot authorization procedure" since last fall will be next on the list and will get fairly sizeable allotments. Steel may be sharply limited for the sign manufacturers, however.

Reconversion will not be a difficult process for most of our industries. Production is expected to reach 75 to 90 per cent of pre-war levels within six months after V-E day, provided the materials are available. Retooling will also depend on the basic materials, but our war economy has developed a tremendous machine tool industry that may eliminate quickly any tool difficulties.

Lead and antimony will be hard to get for some time after Germany col-

lapses, informed quarters in Washington indicate. WPB tightened controls over use of lead during March and early April, and these restrictions will be maintained well into the Japanese campaign.

Though end-use controls over materials under L and M orders of WPB may be relaxed, inventory restrictions are expected to be retained to protect small business and veterans.

Outline of reconversion plan

The WPB reconversion plan involves several definite procedures, as follows:

1. Cutbacks will be handled, wherever practicable, in such a way as to distribute equitably the production load throughout the nation.

2. Positive assistance through controlled material allotments and preference ratings for new or additional production of a very limited number of civilian products now in such short supply as to endanger the war-supporting economy.

3. Measures to facilitate rapid reconversion through positive assistance for tools, equipment, construction, and long lead-time materials and components needed to begin large-scale production promptly when further cutbacks occur.

4. Suspension of most of the so-called "rating floors" which now prohibit the acceptance or delivery of materials, components and equipment on unrated orders. There may be some exceptions in the case of scarce commodities and components.

5. Open-ending the Controlled Materials Plan, by permitting delivery and acceptance of steel, copper or aluminum without allotments, subject to preference at mills and warehouses for all orders covered by allotments.

6. Relaxation or suspension as quickly as practicable of a substantial number of L and M orders of WPB which now prohibit or restrict production and distribution. WPB

will continue to limit the production of some goods requiring materials still in scarce supply.

7. Revocation of most of the conservation orders specifying the kind of materials to be used in making certain products.

8. Some relaxation in construction order L-41 to permit the most urgently needed civilian construction.

9. Steps to insure that, where production is authorized on a restrictive basis, small business and new producers are given full opportunity to participate.

10. Introduction of a simplified priority system to replace CMP and other priorities at the earliest possible date.

11. Procedure for authorizing construction or production in certain local areas, as exceptions to nationwide limitation orders, to permit utilization of labor and resources which can not practicably be used for war production or civilian manufacture not under limitation orders.

12. The War Production Board will continue specialized controls over all materials continuing in tight supply such as tin, crude rubber, textiles, lumber, and certain chemicals, to assure meeting all essential war and civilian needs.

These policies can readily be interpreted to mean that WPB will give the green light to limited civilian output during the Pacific war, but will reserve the right to deny output authorizations where the flow of materials to the Pacific might be hampered. Furthermore, the procedures are flexible enough to permit WPB to re-impose restrictions if material shortages do not ease considerably, as the European war ends.

Controls on containers tightened

Another factor which must be noted in a discussion of current Washington developments is the sharp tightening of controls over containers which WPB effected at the close of the first quarter. The April-June period will see some products made but not packaged, officials believe.

The extent of this container shortage will be measured in the amount of re-use of containers which industry makes. This container shortage is not limited to any one type of shipping material, but includes steel drums, paper bags, wooden boxes, fiber boxes, and other packages.

The end of the European war, according to former director of War Mobilization James F. Byrnes, will probably result in a 20 per cent release of resources from munitions production during the first quarter following V-E day, an additional five per cent during the second quarter, and still another five per cent during the third quarter.

Chemicals reconversion

will be slow

The chemicals reconversion will be less sudden, because the Japanese campaign will require tremendous quantities of chemicals. Just how the shift will affect ceramics has not been determined by government officials as yet. They say that the army and navy have not indicated where chemical cutbacks will come, and until that time no indications can be accurate as to the availability of materials and facilities for civilian ceramics.

The Byrnes report added that "existing shortages certain to continue after V-E day will make it necessary to retain orders on materials such as textiles, paper and pulp, lumber, leather, containers and chemicals until the supply exceeds demand." Limitations on the consumption of most metals will be necessary only for a relatively few months.

Antimony situation stable

The 90 per cent cut in the small order exemption for antimony, effected through M-112 as amended March 14, has not resulted in any serious dislocations in the industry as yet, government officials state. Some appeals have come in under paragraph (g) of the order, but these have been relatively few in number. The order as revised reduced from 2,240 pounds to 224 pounds the amount of contained antimony in various forms which may be delivered

to or accepted by any user in one month. Increases in military demands for flame-proofing cotton duck and fire-retarding paints have necessitated this tightening of civilian restrictions, officials say. It is believed, however, that civilian uses will not be sharply curtailed, since the 224 pound exemption and the appeals procedure permit use of the material for most essential civilian needs.

New production facilities

being considered

To increase the flow of antimony of the various types to essential civilian and military uses, efforts are now being made in the government to obtain new facilities for production of antimony metal and oxide. Authorizations for the plant expansions or new construction are under discussion in appropriate governmental circles. This extra production, it is hoped, will be available for third quarter use.

Lead outlook unfavorable

The outlook for lead chemicals is not favorable, WPB states. Due to a shortage of metallic lead, the permitted consumption of the chemicals by manufacturers of decorative materials such as art pottery, costume jewelry and the like has been wiped out by an amendment to M-384. Makers of vitrified and semi-vitreous chinaware for other than feeding purposes were also hit by the March 27 amendment. All other uses, however, fared as well or better than under the previous ruling. Formerly, the 25 per cent limit on use of lead in ceramics was uniform throughout the industry, with the first six months of 1944 as the base period for determining permitted use. As the order now stands, the lead is to be channeled to "essential" uses. For instance, vitrified china tableware manufacturers whose products are designed for institutional or mass feeding will be allocated lead at a quarterly rate equal to 50 per cent of their first six months use in 1944, or will receive 1,000 pounds per calendar quarter, whichever is greater.

Chemical, electric and industrial ceramics manufacturers may use up

to 50 per cent of the lead used in the first six months of 1944 or 1,000 pounds per quarter, whichever is the larger amount.

Unlimited quantities of lead chemicals will continue to be used in "preferred" glass products, while the denial of lead chemicals for civilian glass is retained.

Frit included under M-384

The thorough-going revision of M-384 spells out the appeals procedure. All large users of lead chemicals are now required to file two copies of form WPB-4138 with the WPB chemicals bureau by the 20th of the month following the end of each quarter, showing their consumption of lead chemicals during the preceding quarter. Users of a total of 1,000 pounds or less per quarter need not submit these reports.

The action also inserts definitions of "frit" and "sodium plumbite" to make it clear that these materials are included under the restrictions of M-384.

The availability of lead chemicals will closely follow the pattern of control exercised under the over-all lead order M-38. This order has been tightened recently, and no easement in its restrictions is now in sight.

MORE WASHINGTON NEWS

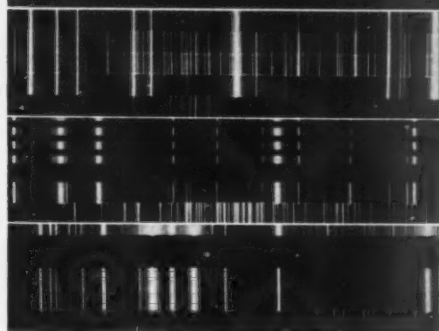
Expanded production schedules and the continuing withdrawal of male workers for the armed forces are reflected in the shift of nine areas into Group 1 in the War Manpower Commission's revised labor market area classifications effective March 20, WMC announced.

Additions to the Group 1 list, all from Group 2, include Anderson, Ind.; DeKalb, Ill.; Grand Rapids, Mich.; Indianapolis, Ind.; Jackson, Mich.; Perth Amboy, N.J.; Peoria, Ill.; Toledo, Ohio, and Youngstown, Ohio. In all of the areas there are plants on the "must" list where production is lagging. To date all efforts to recruit manpower sufficient to meet their needs have failed, WMC said.

In five areas, previously classified as Group 1, production adjustments, including cutbacks, required their reclassification into Group 2. They are Meriden, Conn.; Pascagoula, Miss.; Racine, Wis.; Savannah, Ga., and Ventura-Oxnard, Cal.

The next WMC area classification will be announced May 1.

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*Harshaw Research Labor-
atories located in Cleveland*



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BRANCHES IN PRINCIPAL CITIES

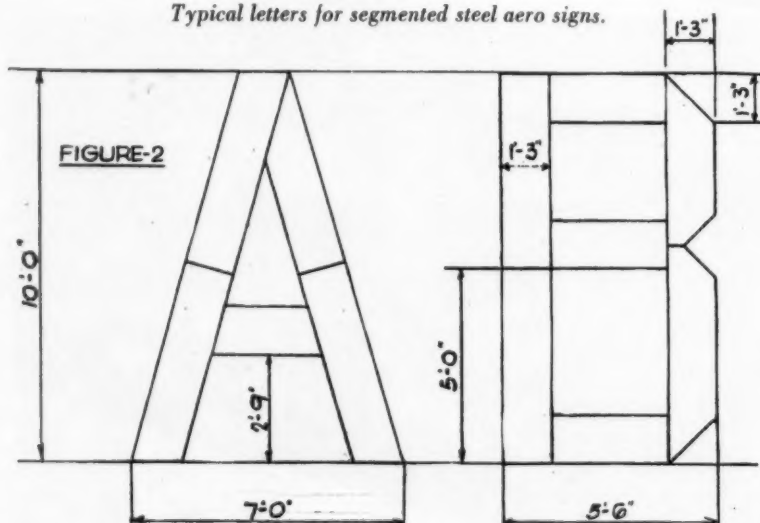
Weatherproof aero signs offer a new market for porcelain enamel

(Continued from Page 24)

porcelain enameled steel segmented sections which can be readily assembled into letters, figures, or symbols as desired. Typical segments, letters

colors are true and not subject to the fading from sun or weather that is characteristic of inorganic colors. The high reflective value of a porce-

Typical letters for segmented steel aero signs.



and figures are illustrated in Fig. 1. These enameled steel segments can be made by any porcelain enamel plant, and shipped in compact boxes, each containing the segments for a letter or character with detailed directions and the necessary screws and washers required for quick and easy assembly on the surface selected.

The height of letters, sizes, colors, shapes and widths of strokes in the proposed segmental porcelain enamel markers all conform to the CAA suggested standards as presented in their book on "Air Marking." Best of all, however, is the strength and permanence of porcelain enamel markers and their smooth gleaming finish. Temperature variations will not affect porcelain enamels; nor will porcelain enamels peel or scratch. Likewise, they can be made stainproof and moistureproof, making it a simple matter to keep a city or directional marker clean and easily seen from a distance. An occasional washing with soap and water is all that is required to restore them to original gleaming brilliance — a much easier task than repainting or touching up a faded temporary sign. Porcelain enamel

lain enameled surface makes it ideal for use as markers, particularly in the case of illuminated markers which will aid in night navigation.

Chambers of Commerce and progressive industrialists, as well as modern store owners, have taken advantage of the attractive glistening appearance and permanence of porcelain enamel as applied to advertising signs and store fronts. Now the field of air marking lies open and it will be easy for any town or company to literally "put itself on the map," so that air travelers can quickly connect an attractive location with an attractive sign, easily read from the air and equally easily and economically installed on a convenient roof without harm to the roofing or the need for special tools or skilled labor. And last, but not least, investigation indicates that these permanent porcelain enameled aero signs will be comparable in cost with temporary painted signs.

A. C. S. general session papers

(Continued from Page 36)

in many ways. He will have learned to get along with other men.

In discussing the older engineers it is brought out that release from service offers an opportunity to change jobs. Military service will have made the older engineer more personnel minded — that is, conscious of the importance of personnel pro-

urement, training and assignment. It is pointed out that the older engineer will resent the advancement in industry of others of his age who were not in service. The paper states military service will have weeded out the poorly adjusted individuals and that an honorable discharge is indicative of a well adjusted individual.

War veterans in the postwar ceramic industry

By J. E. EAGLE

Most ceramic engineers now in the armed services will expect to return to positions in the industry. They will want to be brought up to date with respect to ceramic technology and developments. How will they secure this information? — refresher courses, files of technical papers, trade magazine digests? Will they secure positions by advertising themselves to the industry or through some coordinated plan sponsored by the Society?

Is there a place in the industry for veterans who will be physically handi-

capped? Other industries have developed detailed courses of training and job instruction to utilize wherever possible a supply of labor which is considered particularly dependable, and to provide a means of livelihood on a strictly economic basis for men to whom all American industry is indebted. It is recommended that a committee of the Society be appointed to study the feasibility of employing disabled veterans in selected occupations and to consider the establishment of on-the-job training programs.

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2. Elimination of conventional ground coat.
3. Elimination of copper heading.
4. Improved sag resistance.
5. Improved resistance to warping.
6. Excellent deep drawing qualities.

7. Use of conventional cover coats directly on metal.

8. Resistance to hydrogen penetration or absorption.

The benefits you derive from these advantages are: Lighter enamel weights and coats...reduction of chippage and mechanical breakage losses...increase in production efficiency through reduction of re-work and re-operation...sharply improved thermal shock resistance of

white enamel, due to thinner enamel thickness...overall cost reduction for enameled ware...increase in production speed. Even when a ground coat is used this NEW Titanium Steel for Vitreous Enameling brings important manufacturing cost reductions.

Manufacturers of both steel and enameled products may obtain complete factual technical data from a member of our Technical Staff, or by mail. Consult your steel supplier on deliveries.



Pending patent applications on the new enameling process and product made thereby are owned jointly by Inland Steel Company and The Titanium Alloy Manufacturing Company under Trust Agreement.

THE TITANIUM ALLOY MANUFACTURING COMPANY

Executive Offices: 111 BROADWAY, NEW YORK, N. Y.

General Offices and Works: NIAGARA FALLS, N. Y.

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The effect of war production on metal stamping technique

(Continued from Page 15)

increased markets. These new techniques and improvements will materially aid in achieving better appearance and greater strength at lower costs. Given the opportunity, steel and stamping engineers, working with enamelers, can produce results almost undreamed of in the past.

Enamelers must study . . .

All enamelers should be familiar with the various types of gas and electric welding now used in joining steel stampings, and the various types of welded joints which can be enameled successfully. Copper hydrogen brazing should be studied to determine if this method produces joints that can be satisfactorily enameled. The successful enameling of welded and brazed joints will expand the use of stampings in such equipment as hot water storage heaters, food processing kettles, chemical equipment and

equipment subject to corrosion such as blowers handling certain liquids or gases. Enameled stampings will also be much more widely used architecturally, i.e., in homes, stores, schools, public buildings, and ship construction such as bulkheads, galleys and flues.

Enamelers and stampers working together in capitalizing new wartime techniques, methods and materials are looking forward to interesting and profitable markets in the years ahead.

Continued cooperation within industries through groups such as the Porcelain Enamel Institute and the Pressed Metal Institute has been of inestimable value in expediting production during the war. Cooperation between industries through these and other Associations will be of great assistance in applying new methods and techniques in the interests of producing quality consumer goods at mass production prices.

New industrial horizons . . . (Part II)

(Continued from Page 23)

thought with you about advertising and mass selling. It is the first principle of good advertising: No advertising can possibly help the seller unless it first helps the buyer — by giving him information he wants and needs.

May I suggest that you put your advertising and sales literature to that test?

The challenge of education

However, there is another challenge that faces all manufacturers. I think it is even greater than the engineering or selling challenge — and that is the challenge of education. If in the end we are to preserve the system of American free enterprise based on a high-wage, low-cost, job-producing philosophy, then we must sell that philosophy to the layman, and especially to the worker. And whether we believe it or not, or whether we like to believe it or not,

that idea has not been sold — and, if it has not sold, some other philosophy will prevail and we shall have lost our opportunity to establish this type of economy.

It would be untruthful to say that no progress has been made. Certainly many labor leaders understand that mechanization produces higher wages for workers. John L. Lewis has stated this publicly over and over again. In a recent issue of "Fortune," there is an article by a labor leader — Edward T. Cheyfitz — which states the case for high industrial efficiency and its benefits to the worker as clearly as any industrialist could state it. But the pronouncements of top leaders do not always necessarily reflect the opinion of the lower ranks. If we don't persuade a large share of the American people, including the workers, of the social benefits as well as the economic benefits of higher industrial efficiency, the ignorance on

the part of many people may in the end destroy our opportunity to bring about the full benefits of labor-saving machinery. It may well destroy the possibility of our opening up the new industrial horizons which can be attained from the testimony which has been produced from the record. Can we not say that our challenge is reasonably clear?

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1" to 2" inclusive, per inch	6.00	5.50	5.00
3" to 5" inclusive, per inch	5.50	5.00	4.50
6" to 9" inclusive, per inch	4.50	4.00	3.50

Measured in vertical column inches, columns 2½ inches wide. Accepted in column inch multiples only. Add 25% for reverse plates.

POSITIONS WANTED

POSITION WANTED

Ceramic engineer with 21 years combined technical and practical experience in sheet steel and enameling fields. Experience includes laboratory work, technical service and engineering. Ten years in enameling. Interested in permanent connection with enamel, steel or enamel supply source in technical sales or service capacity. Would also consider connection with enameling plant in development and engineering of new items. References. In reply address Box 545, *Finish*, 360 N. Michigan Ave., Chicago 1, Ill.

POSITION WANTED—Service man for frit manufacturer or steel mill. Have long experience in both practical and technical phases of porcelain enameling. Am now employed, but interested in position with well rated firm for post-war. In reply address Box 5451, *finish*, 360 N. Michigan Ave., Chicago 1, Illinois.

EQUIPMENT FOR SALE

FOR SALE—Equipment for wet and dry process enameling plant. Will sell complete or as individual items — furnaces, mills, pickling tanks, sandblast and all allied equipment. Write Box 445A, *finish*, 360 N. Michigan Avenue, Chicago 1, Ill.

FOR SALE—Mill room and pickle room equipment. Includes several mills in good condition, and pickling tanks suitable for job enameling. All units reasonably priced for quick disposal. Write Box 5452, *finish*, 360 N. Michigan Ave., Chicago 1.

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